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Part C 27

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Project 10627.003.0

Carmen D. Santos
Project Manager
RCRA Corrective Action Office
Waste Management Division
USEPA Region 9
Mail Code WST-4
75 Hawthorn Street
San Francisco, California 94105

Re: Former Pechiney Cast Plate Facility (3200 Fruitland Avenue)

Dear Ms. Santos:

Please find attached our responses to U.S. EPA's Conditions C.2, C.3, C.5 and C.6 listed in the July 2, 2010[1] conditional approval letter. Included with the attached response summary are the following documents:

- Attachment 1 - Impact of Additional Soil and Concrete Characterization on Risk-Based Remediation Goals (Condition C.3.a). This document presents the findings of the recent concrete and soil testing outlined in the 2010 Sampling and Analysis Plan and an evaluation of potential human health risks associated with the dioxin-like PCB congener data.

- Revision to the Site-Specific Modeling for the Protection of Groundwater presented in Appendix C of the 2007 PCB Notification Plan Application (Condition C.3.d).

- A figure depicting a proposed Conceptual Interim Cap to be placed over the 4a/4b excavation areas (Condition C.3.e).

In addition, a preliminary grading plan outlined under Condition C.3.c. will be provided to U.S. EPA under separate cover. Please give me a call to discuss, or if you need any additional information.

Sincerely yours,
AMEC Geomatrix, Inc.

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[1] U.S. EPA, July 2, 2010, Polychlorinated Biphenyls – U.S. EPA Conditional Approval Under 40 C FR 761.61(c) Toxic Substances Control Act – "Polychlorinated Biphenyls Notification Plan, Former Pechiney Cast Plate, Inc. Facility, Vernon, California."

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ATTACHMENT 1

IMPACT OF ADDITIONAL SOIL AND CONCRETE CHARACTERIZATION ON RISK-BASED REMEDIATION GOALS

As part of the U. S. Environmental Protection Agency's (U.S. EPA's) conditional approval (U.S. EPA, 2010a) of the Polychlorinated Biphenyl (PCB) Notification Plan (AMEC, 2009a), U.S. EPA deferred approval of proposed remediation goals for PCBs in soil and concrete at the former Pechiney Cast Plate facility (the Site) until Pechiney could demonstrate that dioxin-like PCB congeners, if present in onsite concrete and/or soil, do not increase the cumulative cancer risk for the Site above 1×10^{-5}. If this risk level were exceeded, it was required that Pechiney propose, for U.S. EPA's approval, cleanup levels for PCBs in concrete and soil that are adequately protective and do not pose a risk of injury to health or the environment. Based on this requirement, the additional sampling outlined in Section 2.2 of the Sampling and Analysis Plan (SAP) (AMEC, 2010) was conducted in September and October, 2010, and the sampling results were evaluated for potential human health concerns. The findings of this additional investigation are presented below.

1.0 SUMMARY OF POTENTIAL HUMAN HEALTH RISKS AND PCB REMEDIATION GOALS PRESENTED IN THE PCB NOTIFICATION PLAN

Potential human health risks associated with hypothetical exposures to PCBs in soil and concrete at the Site were originally estimated in the PCB Notification Plan (AMEC, 2009a), and subsequently in the Feasibility Study (FS) within the context of cumulative exposures to all chemicals of potential concern (COPCs) at the Site (AMEC, 2009b). Potential human health risks were evaluated separately for soil and concrete for each "Phase area" of the Site, assuming concrete building slabs may be demolished on site, crushed, and reused as fill in soil and foundation removal areas. Based on the maximum detected concentrations of PCBs (as Aroclors) in soil (between 0 to 15 feet below ground surface [bgs]) and concrete, and risk-based screening levels (RBSLs) protective of potential direct contact exposures, predicted cancer risks and noncancer hazard indexes (HIs) for potential exposures to PCBs were above target levels (10^{-5} cancer risk and a noncancer HI of 1) for hypothetical future worker outdoor commercial/ industrial workers and construction workers in the Phase I, II, and IIIa areas (AMEC, 2009a) as summarized on the next page.

Area	Potential Exposures to PCBs in Soil			Potential Exposures to PCBs in Concrete	
	Predicted Cancer Risks > $1x10^{-5}$		Predicted Noncancer HIs > 1	Predicted Cancer Risks > $1x10^{-5}$	
	Outdoor Commercial/ Industrial Worker	Construction Worker	Construction Worker	Outdoor Commercial/ Industrial Worker	Construction Worker
Phase I	$8x10^{-5}$	-[1]	-	$3x10^{-4}$	$4x10^{-5}$
Phase II	$2x10^{-3}$	$3x10^{-4}$	-	$6x10^{-3}$	$1x10^{-3}$
Phase IIIa	$2x10^{-5}$	-	3	-	-

Note:
1. = the predicted cancer risk did not exceed 10^{-5} or the noncancer HI did not exceed 1.

Carcinogenic PCBs were detected in soil and concrete in other Phase areas of the Site (in soil in the Phase IV and Phase VI areas and in concrete in the Phase IV area), but predicted cancer risks from PCB exposures were well below 10^{-5}. Predicted cancer risks for cumulative exposures to COPCs in soil in the Phase IV and VI areas were above 10^{-5} for certain receptors, but potential exposures to PCBs contributed minimally to these cumulative risks. Specifically,

- a cumulative cancer risk of $1x10^{-4}$ was estimated for outdoor commercial/industrial workers in the Phase IV area, of which potential exposures to PCBs in soil contributed $4x10^{-6}$;
- a cumulative cancer risk of $2x10^{-5}$ was estimated for construction workers in the Phase IV area, of which potential exposures to PCBs in soil contributed $6x10^{-7}$; and
- a cumulative cancer risk of $6x10^{-5}$ was estimated for outdoor commercial/industrial workers in the Phase VI area, of which potential exposures to PCBs in soil contributed $1x10^{-6}$ (AMEC, 2009b).

Potential exposure to arsenic contributed the majority of the cancer risk in these two areas.

Based on the risk assessment results for the Phase I, Phase II, and Phase IIIa areas of the Site summarized above, site-specific remediation goals were proposed for PCBs to mitigate potential direct contact exposures to future workers (AMEC, 2009a, 2009b).

1. Proposed Remediation Goals for PCBs in Concrete

    a. **Total Aroclors – 5.3 milligram per kilogram (mg/kg)**. Based on the carcinogenic RBSL for outdoor commercial/industrial workers (0.53 mg/kg), adjusted to a target cancer risk of 10^{-5}.[1]

2. Proposed Remediation Goals for PCBs in Shallow Soil (0 to 15 feet bgs)

    a. **Aroclor-1254 – 2.0 mg/kg**. Based on the noncancer RBSL for Aroclor-1254 for construction workers and a target noncancer HI of 1.[2]

    b. **Total Aroclors – 5.3 mg/kg**. For soil that may be left exposed at the surface (upper 5 feet). Based on the carcinogenic RBSL for outdoor commercial/ industrial workers (0.53 mg/kg), adjusted to a target cancer risk of 10^{-5}.

    c. **Total Aroclors – 35 mg/kg**. For soil to be left below pavement or other ground cover that only construction workers may come into contact with during construction (or 5 feet below crushed concrete containing less than 5.3 mg/kg). Based on the carcinogenic RBSL for construction workers (3.5 mg/kg), adjusted to a target cancer risk of 10^{-5}.

Additional remediation goals were proposed for arsenic and total petroleum hydrocarbons (TPH) in soil (AMEC, 2009b). However, given the nature of these additional remediation goals, which were not based on potential direct contact exposures (for arsenic, a remediation goal corresponding to site-specific background was proposed; for TPH, remediation goals were proposed for the protection of groundwater, which were lower than concentrations protective of construction worker exposures), the proposed remediation goals for PCBs were considered adequately protective within the context of cumulative exposures at the Site.

2.0 ADDITIONAL INVESTIGATION

Following U.S. EPA's review of the PCB Notification Plan, the U.S. EPA deferred approval of the proposed remediation goals until after additional information was provided, including additional soil and concrete characterization for PCBs (U.S. EPA, 2010a). An additional 82 concrete samples and 65 soil samples were collected in September and October, 2010, and analyzed for PCBs as Aroclor mixtures using U.S. EPA Method 8082. Of these, nine of the concrete samples and 17 of the soil samples were "split" for additional analysis by U.S. EPA

[1] Total Aroclors are the sum of Aroclor mixtures. As all Aroclor mixtures were considered potential carcinogens with the same degree of cancer potency, the remediation goals were proposed to address cumulative potential cancer risks.

[2] Of the Aroclor mixtures detected at the Site, only Aroclor-1254 has been identified as a potential noncarcinogen. A potential carcinogen as well, Aroclor-1254 is also included in estimations of Total Aroclors.

Method 1668B for individual "dioxin-like" PCB congeners.[3] The additional congener-specific analyses were performed to address a concern from the U.S. EPA that, based on the age of the facility and the historical manufacturing operations, dioxin-like PCB congeners may be present at the Site at more significant concentrations, in terms of potential human health risk, than PCBs as Aroclor mixtures, and that the remediation goals proposed for total Aroclors in the PCB Notification Plan may, therefore, not be adequately protective. The samples selected for both analyses were not collected at random, rather from areas where total Aroclors were reported from previous rounds of sampling at high, medium, and low concentrations with respect to the proposed 5.3 mg/kg risk-based remediation goal, with the majority of the samples intentionally collected from locations where total Aroclors were just below the remediation goal (within one order of magnitude). Specific information regarding the targeted sample locations and sampling procedures is provided in Amendment 2 to the PCB Notification Plan and Section 2.2 of the SAP. The intent of the targeted sampling was to provide coverage across a range of concentrations so that potential correlations between PCBs as Aroclors and the dioxin-like PCB congeners could be evaluated. An established correlation between PCBs as Aroclors and the dioxin-like PCB congeners could be used to 1) potentially estimate dioxin toxic equivalent (TEQ) concentrations associated with previous sampling results, 2) support (or refine) the site-specific PCB remediation goals, and 3) support remediation confirmation sampling.

2.1 Analytical Results of Additional Concrete and Soil Samples

The results of the additional concrete and soil sampling are provided in Tables 1 through 4, and are depicted on Figures 1 and 2a/2b. The 2010 characterization results for Aroclor mixtures (U.S. EPA Method 8082) in the concrete samples are presented in Table 1. Similarly, the 2010 characterization results for Aroclor mixtures in the soil samples are presented in Table 2. The concrete and soil results are presented by location on Figures 1 and 2, respectively. Consistent with earlier characterization sampling events, the primary mixture of PCBs detected in the 2010 concrete and soil samples was Aroclor-1248, and to a lesser extent, Aroclor-1254 and Aroclor-1260. Aroclor-1232 was detected in one soil sample and Aroclor-1016, previously not detected in concrete or soil, was detected in four concrete samples and two shallow soil samples (0 to 15 feet bgs).

The 2010 results for dioxin-like PCB congeners in the concrete and soil samples targeted for this additional analysis are presented in Tables 3 and 4, respectively. As presented in these tables, all 12 dioxin-like PCB congeners were detected at least once in both concrete and soil. In both sample sets, PCB 118 was consistently detected at the highest concentrations, followed

[3] Concrete samples were split by first milling each sample to a powder/fine granular mixture, then homogenizing the sample, then dividing the sample into two aliquots. Soil samples were split by manually (mechanically) blending each sample and then dividing into two aliquots.

by PCB 105. However, to put the detected concentrations of dioxin-like PCB congeners into toxicological perspective, dioxin TEQ concentrations were calculated for each sample. Dioxin TEQ concentrations were calculated using the toxic equivalency factors (TEFs) developed by the World Health Organization (WHO) in 2005 (Van den Berg, M. et al., 2006). Where the concentration of an individual dioxin-like PCB congener was reported as not detected, one half of the detection limit was used as a surrogate to calculate the contribution to dioxin TEQ concentrations from that congener. Of the two commonly used approaches to calculating a dioxin TEQ,[4] using one half of the detection limit for non-detect results was considered appropriate for the 2010 concrete and soil data given that all 12 dioxin-like PCB congeners were detected at least once in both data sets, thus providing evidence that all 12 congeners were present at the Site. Dioxin TEQ concentrations for PCB congeners ranged from 2.81 to 14,250 picograms per gram (pg/g) in concrete (Table 3) and 0.14 to 573 pg/g in soil (Table 4). The estimated dioxin TEQ concentrations for the concrete and soil samples are presented by location on Figures 1 and 2a/2b, respectively.

3.0 RISK-BASED SCREENING LEVELS FOR DIOXIN-LIKE PCB CONGENERS AND AROCLOR-1016

RBSLs were developed for dioxin-like PCB congeners following the methodology described in the PCB Notification Plan (AMEC, 2009a). RBSLs were also developed for Aroclor-1016 since this Aroclor mixture had not been previously detected in earlier sampling. The exposure parameters used in deriving the RBSLs are provided in Tables 5 and 6 for outdoor commercial/industrial workers and construction workers, respectively. Toxicity criteria selected for use in developing the RBSLs for Aroclor-1016 and dioxin-like PCB congeners were obtained from the California Environmental Protection Agency (Cal-EPA) Office of Environmental Health Hazard Assessment (OEHHA) (2010) and the U.S. EPA (2010b, 2010c). The resulting RBSLs for Aroclor-1016 and dioxin-like PCB congeners are presented in Table 7 and are summarized on the next page along with the RBSLs originally estimated in the PCB Notification Plan for Aroclor-1232, Aroclor-1248, Aroclor-1254, and Aroclor-1260 (AMEC, 2009a).

[4] The alternative approach to calculating dioxin TEQ is to assume that non-detect congeners are not present and thus contribute zero to dioxin TEQ concentrations.

Chemical	RISK-BASED SCREENING LEVELS (RBSLs)			
	Outdoor Commercial/Industrial Worker		Construction Worker	
	Cancer	Noncancer	Cancer	Noncancer
Aroclors				
Aroclor-1016 (mg/kg)	0.53	26	3.5	6.9
Aroclor-1232 (mg/kg)	0.53	--	3.5	--
Aroclor-1248 (mg/kg)	0.53	--	3.5	--
Aroclor-1254 (mg/kg)	0.53	7.5	3.5	2.0
Aroclor-1260 (mg/kg)	0.53	--	3.5	--
Dioxin-like PCB Congeners				
PCB 77 (pg/g)	81,000	3,800,000	500,000	1,000,000
PCB 81 (pg/g)	27,000	1,300,000	180,000	340,000
PCB 105 (pg/g)	270,000	13,000,000	1,800,000	3,400,000
PCB 114 (pg/g)	270,000	13,000,000	1,800,000	3,400,000
PCB 118 (pg/g)	270,000	13,000,000	1,800,000	3,400,000
PCB 123 (pg/g)	270,000	13,000,000	1,800,000	3,400,000
PCB 126 (pg/g)	81	3,800	530	1,000
PCB 156, 157 (pg/g)	270,000	13,000,000	1,800,000	3,400,000
PCB 167 (pg/g)	270,000	13,000,000	1,800,000	3,400,000
PCB 169 (pg/g)	270	13,000	1,800	3,400
PCB 189 (pg/g)	270,000	13,000,000	1,800,000	3,400,000
Dioxin-like PCB congeners (pg/g TEQ)	8.1	380	53	100

The detected concentrations of Aroclor-1016 in the 2010 concrete samples (maximum detected concentration of 0.32 mg/kg; Table 1) and soil samples (maximum detected concentration of 0.25 mg/kg; Table 2) are below the estimated RBSLs for outdoor commercial/industrial workers and construction workers. As a result, Aroclor-1016 in concrete or soil does not pose a potential health risk to future workers at the Site. Within the context of cumulative exposures and proposed risk-based remediation for total Aroclors, the maximum total Aroclor concentrations in the samples with detected concentrations of Aroclor-1016 are 0.53 mg/kg in concrete (Sample ID DC-235-A; Table 1), and 0.25 mg/kg in shallow soil (Sample ID 203-SS-01; Table 2), both of which are well within the proposed 5.3 mg/kg remediation goal for total Aroclors in concrete or shallow soil.

4.0 POTENTIAL HUMAN HEALTH RISKS FROM DIOXIN-LIKE PCB CONGENERS VERSUS PCBs AS AROCLOR MIXTURES

For dioxin-like PCB congeners, the potential human health concern pertains to whether or not these congeners present a more significant human health risk than PCBs as Aroclor mixtures. To evaluate this potential concern, regression analyses and human health risk calculations were performed with the pairs of dioxin-like PCB congener and Aroclor mixture data from the 2010 concrete and soil samples.

4.1 REGRESSION ANALYSES OF DIOXIN TEQ VERSUS TOTAL AROCLORS

Regression analyses were performed with the pairs of dioxin-like PCB congener and Aroclor mixture data to evaluate the potential significance of the relationship between these measurements and determine whether the proposed risk-based remediation goals are adequately protective of potential PCB exposures. Dioxin TEQ and total Aroclor concentrations for the 2010 concrete and soil samples were plotted against each other as representative variables for the dioxin-like PCB congeners and Aroclor mixtures, respectively. The results of this analysis are provided below.

Separate regression analyses were performed for the concrete samples, soil samples, and concrete and soil samples combined. Each regression was made as dioxin TEQ (y-axis) versus total Aroclors (x-axis). For consistency with the treatment of non-detect congeners in the estimation of dioxin TEQ, one half of the reporting limit for non-detect Aroclor mixtures was used in the calculation of total Aroclors, with results for Aroclors 1016, 1232, 1248, 1254, and 1260 factoring into the total Aroclor concentration calculations.

The data from each sample point were originally plotted by characteristic (i.e., by Phase area and soil sample depth), but no segregation by characteristic was observed. This indicated that

there was no basis to perform statistical regressions on separate subsets of concrete or soil samples. Next, linear regressions were performed for the concrete data, soil data, and concrete and soil data combined using the Regression function in Microsoft EXCEL. In these regressions, the line was forced to pass through the origin (the 0,0 point), resulting in a linear equation in the form, y = mx, where m is a constant. The 95 percent upper confidence limit (95% UCL) and the 95 percent lower confidence limit (95% LCL) for each regression line were also provided by the Regression function in Microsoft EXCEL, providing upper- and lower-bound estimates, respectively, of the slope (m) of each regression line (i.e., there is less than a 5 percent chance that the true slope of the regression is steeper than the UCL and there is less than a 5 percent chance that the true slope of the regression is less steep than the LCL). Combined, the slope of each regression line represents the best estimate of the relationship between dioxin TEQ and total Aroclor concentrations (i.e., the ratio of dioxin TEQ to total Aroclor concentration) for each data set, with the 95% UCL and 95% LCL representing upper- and lower-bound estimates, respectively, of the relationship (ratio) for the data set. These procedures were performed using each data set in an untransformed state (i.e., no logarithmic or other form of transformation was performed on the data prior to the procedures).

The results of the regressions for the untransformed data sets are depicted on Figures 3, 4, and 5 for the concrete data, soil data, and concrete and soil data combined, respectively. As shown in each figure, the results of the regressions were plotted against the proposed risk-based remediation goal for PCBs in concrete and soil that may be left exposed at the surface (upper 5 feet) of 5.3 mg/kg total Aroclors (represented by the black vertical line in each figure), and the equivalent risk-based remediation goal for dioxin-like PCB congeners, 81 pg/g TEQ[5] (represented by the black horizontal line in each figure).

The three regression analyses were repeated using log-transformed data. In this case, the data were transformed using the natural logarithm (symbolized as *ln*). The linear regression was performed on the transformed data using the Regression function in Microsoft EXCEL. In these regressions the line was not forced to pass through the origin. The resulting linear equations had the form of $ln(y) = m ln(x)+b$. The 95% UCL and 95% LCL for these linear regressions were calculated using the method described in Schefler (1979). The results of these regressions are depicted on Figures 6, 7, and 8 for the concrete data, soil data, and concrete and soil data combined, respectively. The regressions using log-transformed data estimated two variables, the slope and intercept. Thus, the 95% UCLs and 95% LCLs for these regressions are curved lines. Furthermore, none of the regression lines in the log-transformed domain had a slope that was exactly unity (1.000), which results in curved lines in the non-transformed domain. In this

[5] Based on the carcinogenic RBSL for dioxin-like PCB congeners for outdoor commercial/industrial workers (8.1 pg/g TEQ), adjusted to a target cancer risk of 10^{-5}.

case, neither the regression lines derived from the transformed data nor the corresponding UCLs or LCLs can be used to estimate the ratio of dioxin TEQ to total Aroclor concentration; however, they can be used to calculate a total Aroclor concentration corresponding to a specified dioxin TEQ.[6]

To compare the relative strength of each regression, the F-statistic for each regression was provided by the Regression function in Microsoft EXCEL. The F-statistic is the ratio of a measure of the goodness of the fit of the regression to the data to a measure of the poorness of the fit. A larger F-statistic corresponds to a better fit of the regression to the data. The resulting F-statistics are provided, along with additional characteristics of each regression, in Table 8. The F-statistic for each of the six regressions exceeded its respective critical value of F corresponding to a significance of 5% (comparable to 95% confidence). These critical values are the minimum value of the F-statistic needed to achieve a statistical significance of 5%. That all F-statistics exceeded their respective critical values indicates high strength for all of the regressions. The statistical significance of the F-statistics for the six regressions ranged from 2.49×10^{-4} to 3.33×10^{-30} (lower values represent greater strength).

The regression with the strongest F-statistic was the regression using the untransformed combined soil and concrete data. Furthermore, this regression using untransformed data has "physical significance," in that the slopes of the regression line, the UCL, and the LCL are estimators of the ratio between dioxin TEQ and total Aroclor concentration. As shown on Figure 5, this regression identifies a concentration of total Aroclors at the risk-based remediation goal equivalent for dioxin TEQ (81 pg/g) that is less than the originally proposed risk-based remediation goal of 5.3 mg/kg for concrete and shallow soil (upper 5 feet). Specifically, the total Aroclor concentrations corresponding to 81 pg/g dioxin TEQ on the regression line, the UCL, and the LCL are 3,540, 3,450, and 3,640 µg/kg (3.54, 3.45, and 3.64 mg/kg), respectively. As a result, it would appear that a revised risk-based remediation goal for PCBs (as total Aroclors) of 3.5 mg/kg for concrete and soil that may be left exposed at the surface (at a depth interval of 0 to 5 feet bgs) would be adequately protective of PCBs as dioxin-like congeners. To determine if the originally proposed risk-based remediation goal for PCBs (as total Aroclors) in deeper soil of 35 mg/kg would be adequately protective, the results of the regression for the combined soil and concrete data (untransformed) were also plotted against this remediation goal along with the

[6] The ratio of dioxin TEQ to total Aroclor concentration is the relationship between dioxin TEQ and total Aroclor concentration - should be independent of the magnitude of the total Aroclor concentration (i.e., the ratio should be constant with respect to total Aroclor concentration). That the regressions using log-transformed data yield curved lines in the non-transformed domain means that the regressions using log-transformed data suggest that the ratio varies with total Aroclor concentration, which should not be the case.

equivalent risk-based remediation goal for dioxin-like PCB congeners, 530 pg/g TEQ.[7] As shown in Figure 5, the regression using the combined soil and concrete data (untransformed) identifies a concentration of total Aroclors at the risk-based remediation goal equivalent for dioxin TEQ (530 pg/g) that is less than 35 mg/kg. As a result, it would appear that a revised risk-based remediation goal for PCBs (as total Aroclors) of 23 mg/kg for soil to be left below pavement or other ground cover that only construction workers may come into contact with during construction (or 5 feet below crushed concrete containing less than 3.5 mg/kg) would be adequately protective of PCBs as dioxin-like congeners.

4.2 Human Health Risk Calculations for Dioxin-Like PCB Congeners and Aroclor Mixtures

Potential human health risks associated with the dioxin-like PCB congener and Aroclor mixture data from the 2010 concrete and soil samples were also comparatively estimated to further assess the need to revise the proposed risk-based remediation goals based on Aroclor mixtures presented in Section 4.1.

Hypothetical, representative exposure point concentrations (EPCs) were calculated for the 12 dioxin-like PCB congeners and five Aroclor mixtures detected in the 2010 concrete and soil characterization samples. For the dioxin-like PCB congeners, EPCs were calculated for the individual congeners as well as for dioxin TEQ. For this evaluation, EPCs were calculated for the concrete and soil data combined, assuming that exposure of future workers is potentially complete for both media (i.e., assuming concrete building slabs may be demolished on site, crushed, and intermixed with soil for reuse in removal areas). U.S. EPA's ProUCL product (U.S. EPA, 2010d) was used to determine UCL of the mean EPCs for dioxin TEQ, each dioxin-like PCB congener, and each Aroclor mixture. The resulting ProUCL output is provided in Supplement A.

Potential human health risks from exposure to PCBs were then estimated by quantitatively comparing the resulting EPCs to the RBSLs presented above in Section 3.0. To streamline the evaluation, EPCs were only compared to the lowest of available RBSLs, the cancer-based RBSLs for outdoor commercial/industrial workers. Comparing the EPCs to these RBSLs would provide a conservative estimate of potential human health risks from exposure to PCBs as dioxin-like congeners versus PCBs as Aroclors. Predicted lifetime excess cancer risks were calculated for outdoor commercial/industrial workers by dividing each EPC by the appropriate cancer-based RBSL, and then multiplying these risk ratios by the target risk level used in the development of the RBSLs (i.e., one-in-one million or $1x10^{-6}$). Risks from exposure

[7] Based on the carcinogenic RBSL for dioxin-like PCB congeners for construction workers (53 pg/g TEQ), adjusted to a target cancer risk of 10^{-5}.

to dioxin-like PCB congeners were then comparatively evaluated to risks from exposure to the Aroclor mixtures.

The results of the analysis are presented in Table 9. As presented, the predicted lifetime excess cancer risk for outdoor commercial/industrial worker exposure to dioxin-like PCB congeners is 2×10^{-4} based on EPCs for each of the individual congeners, but 8×10^{-4} based on dioxin TEQ. The difference in these risk estimates can be attributed to the influence of elevated detection limits in the sample-specific calculations of dioxin TEQ. By comparison, the predicted lifetime excess cancer risk for outdoor commercial/industrial worker exposure to Aroclor mixtures is 5×10^{-4}. As a result, it would appear that, on average, the dioxin-like PCB congeners do not pose a more significant human health risk than PCBs evaluated as Aroclor mixtures, but on a sample-by-sample basis (as dioxin TEQ), the congeners present a slightly more significant human health risk than PCBs evaluated as Aroclor mixtures. These results are consistent with the results of the regression analysis. Given that the potential human health risks from dioxin-like PCB congeners as dioxin TEQ are slightly more significant than the potential human health risks from total Aroclors, a slight reduction of the risk-based remediation goals for PCBs as total Aroclors (as illustrated by the regression analyses) would be necessary to be adequately protective of PCBs as dioxin-like congeners.

5.0 SUMMARY OF REVISED PCB REMEDIATION GOALS

Based on the above evaluations, the revised PCB remediation goals proposed for the Site are summarized below.

1. Proposed Remediation Goals for PCBs in Concrete
    a. **Total Aroclors – 3.5 mg/kg**. Based on the regression analysis for dioxin-like PCB congeners versus total Aroclors in combined soil and concrete, the total Aroclor concentration that would result in a maximum dioxin TEQ concentration of 81 pg/g.
2. Proposed Remediation Goals for PCBs in Shallow Soil (0 to 15 feet bgs)
    a. **Aroclor-1254 – 2.0 mg/kg**. Based on the noncancer RBSL for construction workers and a target noncancer HI of 1.
    b. **Total Aroclors – 3.5 mg/kg**. For soil that may be left exposed at the surface (upper 5 feet). Based on the regression analysis for dioxin-like PCB congeners versus total Aroclors in combined soil and concrete, the total Aroclor concentration that would result in a maximum dioxin TEQ concentration of 81 pg/g.

c. **Total Aroclors – 23 mg/kg**. For soil to be left below pavement or other ground cover that only construction workers may come into contact with during construction (or 5 feet below crushed concrete containing less than 3.5 mg/kg). Based on the regression analysis for dioxin-like PCB congeners versus total Aroclors in combined soil and concrete, the total Aroclor concentration that would result in a maximum dioxin TEQ concentration of 530 pg/g.

6.0 REFERENCES

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United States Environmental Protection Agency (U.S. EPA), 2010a, Polychlorinated Biphenyls – U.S. EPA Conditional Approval Under 40 CFR 761.61(c), Toxic Substances Control Act – "Polychlorinated Biphenyls Notification Plan, Former Pechiney Cast Plate, Inc., Facility, Vernon, California, July 9, 2009," Letter from Jeff Scott, Director, Waste Management Division, to Donald Thompson, President Pechiney Cast Plate, July 2.

U.S. EPA, 2010b, Integrated Risk Information System (IRIS) Database, http://www.epa.gov/IRIS/subst/index.html.

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U.S. EPA, 2010d, ProUCL, Version 4.00.05, June, Downloaded from http://www.epa.gov/esd/tsc/software.htm.

Van den Berg, M., et al., 2006, The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Euivalency Factors for Dioxins and Dioxin-Like Compounds, Toxicological Sciences, 93(2): 223-241, October.

Appendix C
(Revised October 2010)

Site-Specific Modeling for the Protection of Groundwater

Revision Background

This Appendix was originally submitted to the U.S. Environmental Protection Agency (U.S. EPA) with the 2009 PCB Notification Plan.[1] As part of U.S. EPA's conditional approval of the PCB Notification Plan[2], U.S. EPA requested Pechiney to revise Appendix C to address the following questions (in *italic*). Responses to these questions are summarized below, and the applicable revisions to the model have been incorporated in this appendix.

1. *Since the mode was run over a period of 500 years and in order to simulate a more conservative worst case, a suggested 250-500 year recurrence interval for rainfall would be more realistic. In addition, short duration, high intensity rainfall events shall be considered. Can the model simulate 24-hour rainfall events such as 100, 250, 500 year 24-hour recurrence intervals that would produce wetting fronts capable of transporting PCBs?*

   Response to the Question 1:

   It would be inappropriate to base the infiltration rate on rainfall with long recurrence intervals such as 250 or 500 years, because it would be unrealistic for rainfall with such recurrence intervals to persist over a period of 500 years. The objective of the site-specific modeling is to evaluate the long-term impacts to groundwater by PCBs in soil and concrete disposed on-site, which requires the use of an infiltration rate that corresponds to long-term average rainfall, instead of extreme events.

   In addition, annual rainfall with 250 to 500 year recurrent intervals cannot be estimated, because only 100 years of rainfall data (from 1906 to 2009) are

[1] AMEC Geomatrix, Inc., 2009a, Polychlorinated Biphenyls Notification Plan, Pechiney Cast Plate Facility, Vernon, California, July 13.
[2] U.S. EPA, 2010, USEPA Conditional Approval for Former Pechiney Cast Plate, Inc., Facility PCB Risk-Based Cleanup Under 40 CFR 761.61(c), July 2.

available at the nearby weather station (Los Angeles Civic Center).[3] Although annual rainfall with a 100-year recurrence interval can be estimated as 34 inches per year, even this estimate contains a fair amount of uncertainty because only 100 years of data are available.

Sufficient conservativeness has been built into the infiltration rate of 4 inches per year used in the site-specific modeling. First, because the final ground surface will be either paved or vegetated and graded to facilitate runoff, the assumed 25 percent of rainfall as infiltration is a conservative assumption. Second, the assumed infiltration rate of 4 inches per year is higher than estimates from other published studies (see Section 2.0 of short duration, high intensity rainfall events, such as 24-hour rainfall with a 100-year recurrence interval, are not expected to substantially impact the downward transport of PCBs through the unsaturated zone. First, during short duration, high intensity rainfall events, infiltration rates would not increase in proportion to rainfall. Most of the rainfall would become runoff because of quick soil saturation near ground surface. In fact, peak runoff during short duration, high intensity rainfall events often drives storm water drainage design. Therefore, infiltration rates during short duration, high intensity rainfall events would not be substantially higher than average infiltration rates. Second, the highest 24-hour rainfall at the nearby weather station between 1906 and 2009 is 5.5 inches, which only translate into a few inches of wetting front movement. Finally, the low mobility of PCBs is mainly a result of their propensity of absorbing to organic matters in the subsurface, as exemplified by their high sorption partition coefficients. For example, a study on a PCB-spill site in Canada concluded that downward flow velocity of dissolved PCBs is likely on the order of millimeters per year (Schwartz et al., 1982).[4] Having higher than average infiltration rates over a handful of days during a 500-year period is not expected to substantially increase the velocity of dissolved PCBs. Therefore, it is unnecessary to simulate extreme rainfall events in the site-specific modeling.

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[3] Western Regional Climate Center, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5115

[4] Schwartz, F.W., J.A. Cherry, and J.R. Roberts, 1982, A case study of a chemical spill: polychlorinated biphenyls (PCBs), 2, Hydrogeological conditions and contaminant migration, Water Resource Research, 18, 535-545.

Nevertheless, to add another level of conservativeness in the site-specific modeling, we revised the infiltration rates so that they consist of five 100-year cycles. Each 100-year cycle is comprised of 99 years with an infiltration rate based on average rainfall (i.e., 4 inches per year) and one year with an infiltration rate based on the rainfall with a 100-year recurrence interval (i.e., 8.5 inches per year). These modifications did not change the results or conclusions of the site-specific modeling.

2. *Have solvents been considered in the mobility and transport of PCBs in soils under both saturated and unsaturated conditions? Can the model factor in the effects of solvents on the mobility of PCBs?*

Response to Question 2:

The site-specific modeling does not include effects of solvents, such as chlorinated hydrocarbons, Stoddard solvent, and total petroleum hydrocarbons, on the mobility of PCBs under saturated or unsaturated conditions because of the lack of quantitative relationships between sorption partition coefficients (or solubility) of PCBs and co-solvent concentrations even in state-of-the-art modeling programs such as MODFLOW-SURFACT. Research has shown that sorption of hydrophobic organic chemicals (HOCs) such as PCBs can decrease in the presence of some solvents, but that the co-solvent effects are measurable (observable) only under two conditions, neither of which occurs at the Site:

a. When the solvents are completely miscible with water; or

b. When polar, partially miscible organic solvents are present in concentrations on the order of a few percents by volume (free product).

Furthermore, the co-solvents that are neither polar nor completely miscible in water, such as trichloroethene, toluene, and *p*-xylene, have little effect on the sorption of HOCs (Haasbeek, 1994; Rao et al., 1990; Pinal et al., 1990).[5,6,7]

[5] Haasbeek, J.F., 1994, Effects of Cosolvency in the Fate and Transport of PCBs in Soil, Remediation, Summer.
[6] Rao, P.S.C., L.S. Lee, and R. Pinal, 1990, Cosolvency and Sorption of Hydrophobic Organic Chemicals, Environmental Science & Technology, 24, 647-654.

Because most of the solvent-related chemicals in soil at the Site belong to the group of nonpolar, partially miscible organic solvents and exist at relatively low concentrations (i.e., far less than a few percents by volume), these chemicals are not expected to have a substantial impact on the migration of PCBs from crushed concrete. Therefore, the effects from residual solvents in soil are not considered in the site-specific modeling.

3. *Appendix C shall explain the fate and transport mechanism involved in the migration of PCBs at depth well below 15 feet bgs (below ground surface). PCBs have been detected at 71 feet bgs (e.g., 0.490 mg/kg).*

Response to Question 3:

The location where PCBs were detected at a depth of 71.5 feet at a concentration of 0.490 mg/kg was observed at one boring advanced near a former vertical pit that contained a hydraulic ram. The hydraulic ram extended to a depth of 65 feet and steel sheet piling for the vertical pit extended to a depth of 47 feet. In this case, the PCBs detected at depth below 15 feet bgs are believed to be associated with the historical operation of the former hydraulic ram within the pit (proposed soil removal Area 4a in former Building 104). The vertical pit was decommissioned in place in the 1970's by Alcoa. As part of the below grade demolition work, the upper 10 feet of the structure will be removed and the remaining portion of the structure will be capped with concrete. Therefore, this preferential pathway for PCBs to migrate below 15 feet bgs no longer exists.

In addition, PCB-impacted soil is proposed for removal to a depth of 15 feet in Area 4a. Once soil is removed a concrete layer will be placed at the base of the soil excavation prior to backfill.

4. *The revised Appendix C shall indicate the particle size used in the model for the crushed PCB-contaminated concrete proposed for onsite disposal.*

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[7] Pinal, R., P.S.C. Rao, L.S. Lee, and P.V. Cline, 1990, Cosolvency of Partially Miscible Organic Solvents on the Solubility of Hydrophobic Organic Chemicals, 24, 639-647.

Response to Question 4:

Particle size is not a parameter in the model. In the original model simulations, the hydrogeologic and Van Genuchten's parameter values for sand from the ROSETTA program were used to approximate the properties of crushed concrete. The ROSETTA program uses USDA soil textual classes or percentages of sand, silt, and clay, rather than particle sizes, as input parameters.

Based on the project engineering specifications, the crushed concrete will be well graded with a particle size of 1 ½-inch or ¾-inch. Therefore, the model for crushed concrete was revised to use the hydrogeologic and Van Genuchten's parameter values for gravel (Fayer et al., 1992)[8]. It should be noted that the downward water flux and PCB migration are limited by the least permeable soil types in the unsaturated zone. Therefore, using either gravel or sand properties will not result in a substantial change to simulation results.

Using the gravel instead of sand properties to represent crushed concrete did not change the results and conclusions of the site-specific modeling.

1.0 INTRODUCTION

PCBs in soil and concrete were evaluated for potential impacts to groundwater through the use of numerical modeling. Numerical simulations were performed to simulate the fate and transport of PCBs in a one-dimensional soil column in the vadose zone. The modeling was performed using commercial software, MODFLOW-SURFACT (HydroGeologic, Inc., 2006).[9] The code for this software is based on the most commonly used groundwater modeling software, MODFLOW (Harbaugh et al., 2000),[10] released by the United States Geologic Survey. The MODFLOW-SURFACT code has an additional capability to simulate the moisture migration as well as the fate and transport of chemicals in vadose zone using the Van Genuchten's model. MODFLOW-SURFACT is similar to the one-dimensional vadose zone transport model,

[8] Fayer, M. J., M. L. Rockhold, and M. D. Campbell, 1992, Hydrologic Modeling of Protective Barriers: Comparison of Field Data and Simulation Results, Soil Science Society of America Journal, 56: 690-700.
[9] HydroGeologic, Inc., 2006, MODFLOW-SURFACT (version 3.0), Reston, Virginia, May.
[10] Harbaugh, A.W., E.R. Banta, M.C. Hill, and M.G. McDonald, 2000, MODFLOW-2000, The U.S. Geological Survey Modular Ground-water Model – User Guide to Modularization Concepts and the Ground-Water Flow Process: U.S. Geological Survey Open-File Report 00-92, p. 121.

VLEACH (Ravi and Johnson, 1994).[11] This code was selected because it is supported by commonly used MODFLOW pre- and post-processing graphical user interface software, Groundwater Vista®, which was released by Environmental Simulation, Inc. (2007).[12]

2.0 MODEL CONSTRUCTION AND PARAMETERS

A one-dimensional MODFLOW-SURFACT model was constructed to simulate a one-dimensional soil column. The model domain consisted of one row and one column. Vertically, the model has thirty layers with a uniform thickness of 5 feet to represent the vadose zone and one layer with a thickness of 50 feet to represent the saturated zone. The groundwater table was assumed to be at 150 feet below ground surface (bgs).

The lithologic profile used in the MODFLOW-SURFACT model was based on the logs of on-site Borings 125 and 126; the lithologic profile developed from these two borings was considered representative of site-wide conditions. The hydrogeologic parameters and Van Genuchten's model parameters for each layer were obtained using the computer code ROSETTA (version 1.2) developed by the Salinity Laboratory of the United States Department of Agriculture (2000).[13] The inputs to the ROSETTA code are the percentage of sand, silt, and clay in each layer. For each boring, the percentages of gravel, sand, silt, and clay in 5-foot intervals between the ground surface and the groundwater table were estimated. The percentage of gravel is combined with the percentage of sand as the ROSETTA does not take percentage of gravel as an input. The percentages in the same interval for the two borings were then averaged to obtain average percentages as input to ROSETTA. In the MODFLOW-SURFACT model for crushed concrete, the hydrogeologic parameters and Van Genuchten's model parameters for gravel were used for the top 15 feet of vadose soil to represent the crushed concrete as fill.

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[11] Ravi, V. and J.A. Johnson, 1994, VLEACH (version 2.1), Center for Subsurface Modeling Support, Robert Kerr Environmental Research Laboratory, Ada, Oklahoma.
[12] Environmental Simulation, Inc., 2007, Groundwater Vista (version 5.01), Reinholds, Pennsylvania, June.
[13] United States Salinity Laboratory, 2000, ROSETTA (version 2.1), Agricultural Research Service, United States Department of Agriculture, November.

The other model parameters are listed below.

- Soil bulk density, ρ = 96 pounds per cubic feet
- Porosity, n = 0.40
- Soil organic carbon content, f_{oc} = 0.39%
- Sorption partition coefficient for PCBs, K_{oc} = 309,000 liters per kilogram

Site-specific soil physical properties were based on the field investigations of the Morrison Knudsen Corporation (1995).[14] The effective porosity value in the model is assumed to be 40 percent, based on an average porosity value of 47 percent. The sorption partition coefficient for PCBs was obtained from U.S. EPA guidance (1996).[15] The dispersivity in the model is assumed to be equal to 15 feet, 10 percent of the simulated distance between PCB source and groundwater table (150 feet).

Infiltration was applied to the uppermost model layer. Different infiltration rates were assumed for stress periods of 11 years or one year in length.[16] An average infiltration rate of four inches per year was assumed for each 11-year stress period, which is approximately 25 percent of the average annual precipitation at the Los Angeles Civic Center weather station (the nearest Western Regional Climate Center Station to the city of Vernon) from 1906 to 2010 (14.7 inches per year).[17] Four inches per year of infiltration is considered conservative for a largely paved or vegetated land surface. As a reference, if the infiltration rate is calculated using the recharge model of Williamson et al., 1989,[18]

$$R = \max[(0.64 \times P - 9.1), 0]$$

where, R = infiltration rate (inches/year)

P = precipitation (inches/year)

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[14] Morrison Knudsen Corporation, 1995, Final Report Stoddard Solvent System Field Investigation, Aluminum Company of America, October 27.

[15] U.S. EPA, 1996, Soil Screening Guidance: Users Guide and Technical Background Document, Office of Solid Waste and Emergency Response, Washington, D.C., EPA/540/R-95/128, May.

[16] The model was set up to run in transient mode for a 500-year period, divided into five 100-year cycles, with each cycle consisting of nine 11-year stress periods with average precipitation (divided into 132 monthly time steps) and one 1-year stress period with 100-year recurrence interval precipitation (divided into 12 monthly time steps).

[17] Western Regional Climate Center, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5115

[18] Williamson, A.K., D.E. Prudic, and L.A. Swain, 1989, Ground-water flow in the Central Valley, California, U.S. Geological Survey Professional Paper 1401-D.

the infiltration rate is approximately 0.4 inches per year. A study on infiltration rates in the Riverside County, which has similar meteorological condition as the site, by USGS also suggested that the land surface infiltration rate is much less than 25% of precipitation.[19] Therefore, the infiltration rate of four inches per year is a conservative assumption, even for an unpaved land surface. For each one-year stress period, an infiltration rate of 8.5 inches per year was assumed, which is approximately 25 percent of the highest recorded annual precipitation from the Los Angeles Civic Center weather station from 1906 to 2010 (34.0 inches per year).[18]

A constant head boundary with the specified head equal to the elevation of the top of the bottom layer was applied at the bottom layer to represent the groundwater table elevation in the saturated zone.

3.0 SIMULATIONS

Two separate simulations, one for PCBs in soil and another for PCBs in concrete (assumed to be crushed and re-used as fill on-site), were conducted to determine if the detected concentrations in either medium pose a threat to groundwater quality. Specifically, the simulations were used to estimate site-specific attenuation factors for PCBs, which were then used in reverse calculations from the groundwater maximum contaminant level (MCL) to determine the concentrations that would be necessary in the vadose zone to pose a potential threat to groundwater.

3.1 PCBs IN SOIL

The MODFLOW-SURFACT model described above was used to estimate site-specific attenuation factors for PCBs in soil at hypothetical source depths of 15 feet, 30 feet, and 45 feet bgs. These attenuation factors were estimated by having the MODFLOW-SURFACT model simulate the movement of PCBs in pore water from these depths to pore water immediately above the water table (at approximately 150 feet bgs) after 500 years. A constant PCB concentration in pore water of 100 micrograms per liter (µg/L) was assumed at each source depth for the simulations. The attenuation factors were then calculated as the ratios of the source pore water concentration (100 µg/L) to

[19] USGS, Rainfall-Runoff Characteristics and Effects of Increased Urban Density on Streamflow and Infiltration in Eastern Part of the San Jacinto River Basin, Riverside County, California, USGS Water-Resources Investigations Report 02-4090.

the simulated pore water concentrations immediately above the water table. All calculations using the MODFLOW-SURFACT simulation results were implemented in Mathcad® (version 14; Parametric Technology Corporation, 2007) (Worksheet C-1).

For the hypothetical source depths of 15 and 30 feet bgs, the simulated pore water concentrations immediately above the water table were below the lowest value that the MODFLOW-SURFACT could report ($1x10^{-44}$ µg/L). The minimum reportable concentration ($1x10^{-44}$ µg/L) was therefore used as the simulated pore water concentration immediately above the water table in calculating the attenuation factors for these two cases. As the pore water concentrations immediately above the water table would actually be lower than this minimum reportable value, the simulated attenuation is actually higher than the results would indicate.

As presented in Worksheet C-1, the attenuation factors calculated with this method ranged from $2.2x10^{44}$ to $1x10^{46}$ for source depths of 15 to 45 feet bgs. These attenuation factors are conservative because the dilution of PCBs after entering the saturated zone and the degradation of PCBs in the vadose zone are not considered in the MODFLOW-SURFACT model. These attenuation factors were then used in a reverse calculation from the MCL, 0.5 µg/L, to estimate the source pore water concentrations at 15 feet, 30 feet, and 45 feet bgs that would be necessary to pose a potential threat to groundwater quality. The estimated source pore water concentrations ranged from $1.1x10^{41}$ to $5x10^{42}$ milligrams per liter (mg/L) (Worksheet C-1). Based on these calculations, the concentration of PCBs in source pore water at the Site would need to exceed $1.1x10^{41}$ mg/L at 45 feet bgs or $5x10^{42}$ mg/L at 15 to 30 feet bgs to result in groundwater concentrations exceeding the MCL. Because these concentrations greatly exceed the solubility limit of PCBs in water (0.7 mg/L; U.S. EPA, 1996)[15] and exceeds the concentration of pure phase PCBs ($1x10^{6}$ mg/L), it is physically impossible to achieve PCB concentrations in the source pore water that would result in a concentration of PCBs exceeding the MCL in groundwater. Therefore, PCBs in soil at the Site do not pose a potential threat to groundwater at the Site.

3.2 PCBs IN CRUSHED CONCRETE

Because crushed concrete containing PCBs may be re-used as on-site fill materials within the upper 15 feet of the vadose zone, the reverse calculation method described above was also used to verify that PCBs in re-used crushed concrete do not pose a potential threat to groundwater quality. The MODFLOW-SURFACT simulation was performed in the same manner as described above for soil, but modified to account for the physical properties associated with crushed concrete. For crushed concrete, the hydrogeologic parameters and Van Genuchten's model parameters for gravel (Fayer et al., 1992)[8] were used rather than the lithologic parameters estimated for the upper 15 feet of the soil column. An attenuation factor was then estimated for PCBs from a source depth of 15 feet bgs, corresponding to the bottom depth of proposed concrete re-use. As presented in Worksheet C-2, the attenuation factor estimated for the concrete re-use scenario was $1x10^{46}$, equal to the attenuation factor estimated for PCBs in native soil at 15 or 30 feet bgs (Worksheet C-1). Correspondingly, the source pore water concentration of PCBs dissolved from crushed concrete at 15 feet bgs would need to exceed $5x10^{42}$ mg/L to result in groundwater concentrations exceeding the MCL. As noted earlier for soil, these concentrations greatly exceed the solubility limit of PCBs in water (0.7 mg/L; U.S. EPA, 1996) and exceed the concentration of pure phase PCBs ($1x10^{6}$ mg/L), and therefore it is physically impossible to achieve PCB concentrations in the source pore water from the crushed concrete that would result in a concentration of PCBs exceeding the MCL in groundwater. Therefore, PCBs in concrete that may be re-used (on-site disposal) as on-site fill materials also do not pose a potential threat to groundwater at the Site.

The changes made to the model for addressing the U.S. EPA's questions did not change the results and conclusions of the site-specific modeling.

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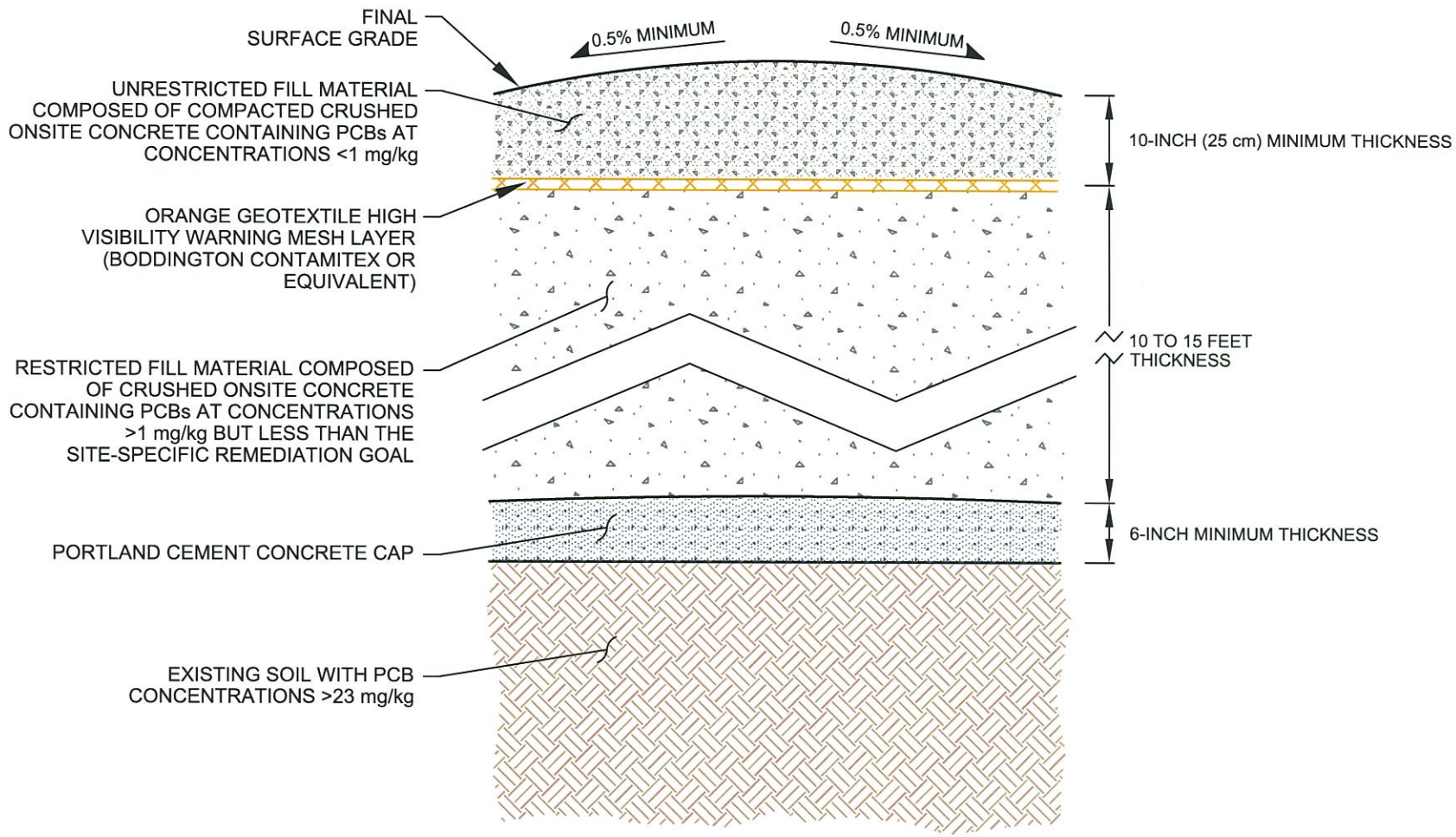


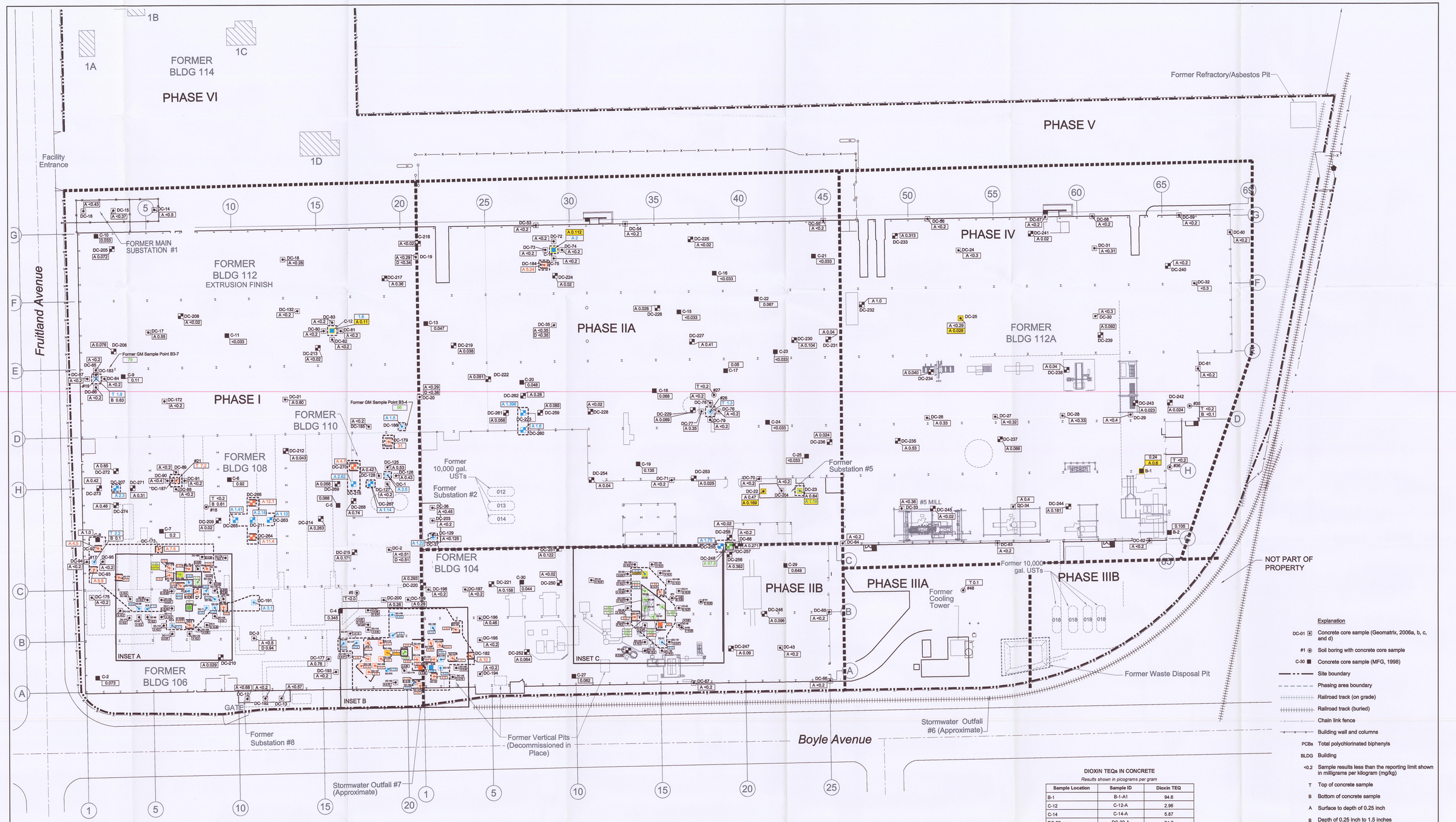
NOTES:

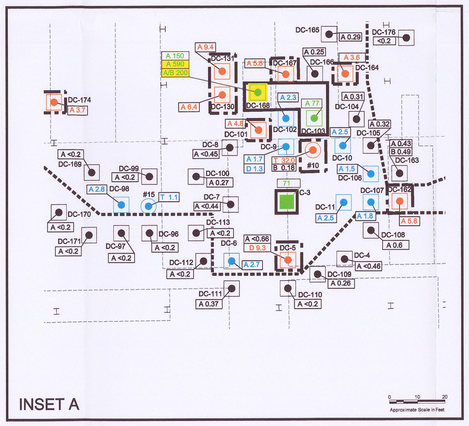
1. CRUSHED ONSITE CONCRETE SHALL BE COMPACTED TO A MINIMUM OF 90 PERCENT AS DETERMINED BY THE LATEST EDITION OF ASTM 01557 (MODIFIED PROCTOR TEST).
2. ONSITE CONCRETE SHALL BE CRUSHED AND GRADED TO CONFORM WITH GREEN BOOK 200-2.4 SPECIFICATIONS.
3. mg/kg = MILLIGRAMS PER KILOGRAM.
4. EXISTING SOIL WITH PCB CONCENTRATIONS >23 mg/kg IN THE 4a/4b AREA WILL BE APPROXIMATELY 15 FEET BELOW GROUND SURFACE.

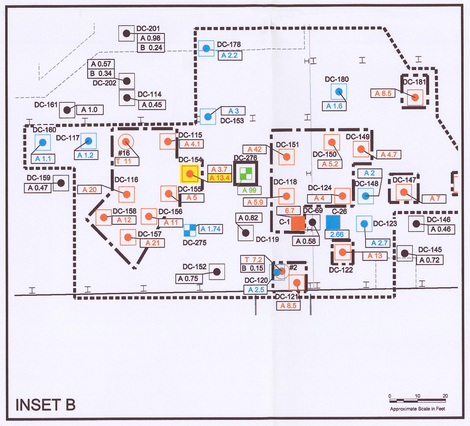
Vertical Dimensions Not To Scale

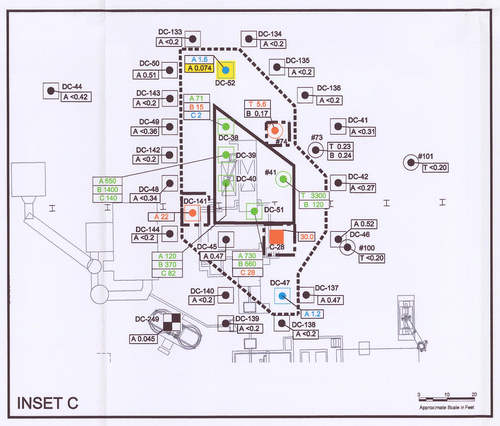
CONCEPTUAL INTERIM CAP
OVER THE 4a AND 4b EXCAVATION AREAS
Former Pechiney Cast Plate, Inc. Facility
3200 Fruitland Avenue
Vernon, California

By: jrw	Date: 12/9/10	Project No. 010627.003
AMEC Geomatrix		Figure 9









Explanation

- DC-01 ⊡ Concrete core sample (Geomatrix, 2006a, b, c, and d)
- #1 ⊛ Soil boring with concrete core sample
- C-30 ■ Concrete core sample (MFG, 1998)
- Site boundary
- Phasing area boundary
- Railroad track (on grade)
- Railroad track (buried)
- Chain link fence
- Building wall and columns
- PCBs Total polychlorinated biphenyls
- BLDG Building
- <0.2 Sample results less than the reporting limit shown in milligrams per kilogram (mg/kg)
- T Top of concrete sample
- B Bottom of concrete sample
- A Surface to depth of 0.25 inch
- B Depth of 0.25 inch to 1.5 inches
- C Depth of 1.5 inches to 3.0 inches
- D Second slab of concrete
- PCB Concentration > 1 mg/kg and < 3.5 mg/kg
- PCB Concentration ≥ 3.5 mg/kg and < 50 mg/kg
- PCB Concentration ≥ 50 mg/kg
- PCB-impacted concrete > 1 mg/kg
- PCB-impacted concrete ≥ 3.5 mg/kg
- PCB-impacted concrete ≥ 50 mg/kg
- Additional concrete locations sampled and analyzed for PCB aroclors using EPA Method 8082 (September and October 2010)
- Concrete locations sampled and analyzed for PCB aroclors using EPA Method 8082 and PCB congeners using EPA Method 1668B; concrete sample collected adjacent to previous location (September 2010)

Approximate Scale in Feet
0 20 40

Basemap modified from Pechiney Cast Plate, Inc. Site Plan dated January 9, 2002; Geraghty & Miller, Inc. "Groundwater Elevation and Volatile Organic Compound Concentrations December 9, 1994" figure dated February 2, 1995; Aluminum Company of America "Alcoa General-MFA" figure dated October 10, 1994; and Los Angeles County Assessor's Office Parcel Map 5012/Sheet 8 dated November 9, 1955.

DIOXIN TEQs IN CONCRETE

Results shown in picograms per gram

Sample Location	Sample ID	Dioxin TEQ
B-1	B-1-A1	94.6
C-12	C-12-A	2.96
C-14	C-14-A	5.87
DC-22	DC-22-A	24.7
DC-23	DC-23-A	52.3
DC-25	DC-25-A	2.81
DC-52	DC-52-A	5.13
DC-154	DC-154-A	656
DC-168	DC-168-C	14,250

TEQ = Toxic Equivalent

Notes:

1. All locations are approximate.
2. All samples are bulk samples unless noted otherwise.
3. Samples analyzed using EPA Method 8082; refer to Table 1 for a summary of test methods and analytical results.
4. Bulk sample results reported in milligrams per kilogram (mg/kg).
5. References:

AMEC Geomatrix, Inc., 2009, Polychlorinated Biphenyls Notification Plan, Former Pechiney Cast Plate, Inc., Facility, Vernon, California, July 10.

Geomatrix Consultants, Inc. (Geomatrix), 2006, Phase II Environmental Site Assessment Report, Pechiney Cast Plate Facility, Vernon, California, March 9.

Geomatrix, 2006, Supplemental Phase II Environmental Site Assessment Report, Pechiney Cast Plate Facility, Vernon, California, December 19.

Geomatrix, 2006, Above Grade Demolition Completion Report, Pechiney Cast Plate, Inc. Facility, Vernon, California, December 26.

McCulley, Frick & Gilman (MFG), 1998, Limited Phase II Environmental Investigation, Alcoa Cast Plate, 5151/5401 Alcoa Avenue, Vernon, California, September 15.

Geraghty and Miller, Inc., 1990, Final Report, Phase III Environmental Assessment for Alcoa - Vernon Plant, Vernon, California, September 6.

Note: Figure shall be produced in color to maintain information.

CONCRETE CHARACTERIZATION SAMPLE LOCATIONS AND PCB CONCENTRATIONS

Former Pechiney Cast Plate Facility
3200 Fruitland Avenue
Vernon, California

By: pah	Date: 12/27/10	Project No. 10627.003
AMEC Geomatrix	Figure	1

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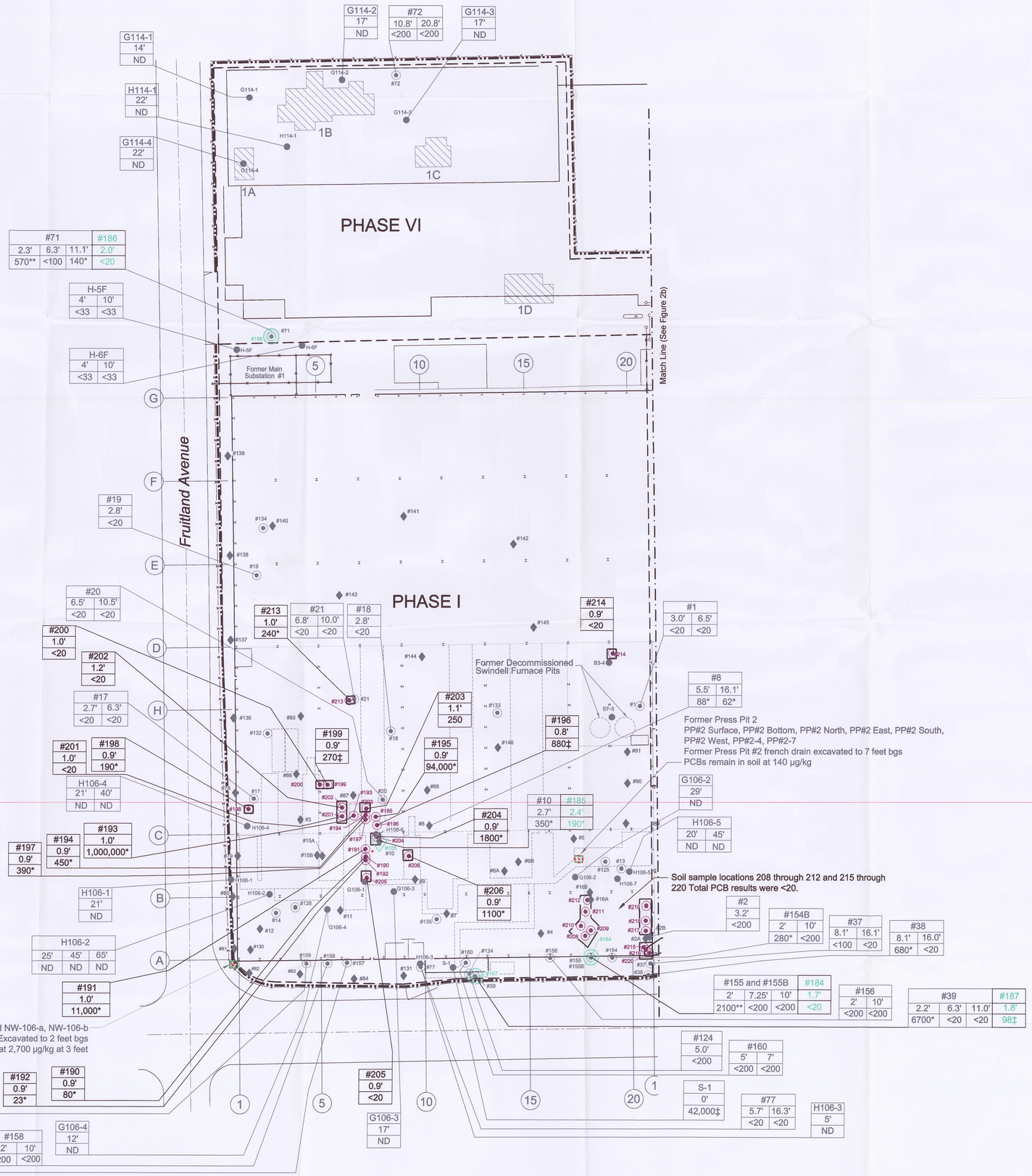


Explanation

- Location for re-sampling for PCBs and PCB dioxin-like congeners (September 2010)
- #187 — Location of sub-slab soil samples for PCBs (September and October 2010)
- #78 — Soil vapor sampling point, 2005 and 2006
- #115 — Soil boring, 2005 and 2006
- B-1 — Soil boring, 1996 and 1998
- Sample taken before and during excavation activities
- 20 G — Column and row numbering system for footings
- Site boundary
- Chain link fence
- Previous excavation (all previous limits of excavation are approximate)
- Previously decommissioned and concrete capped buried structures with PCB impacts in former Alcoa Building 114 (Ursic, 1996)
- BLDG — Building
- 6.0' — Sample depth in feet below ground surface
- <2.0 — Sample result is less than the reporting limit shown
- E — Previously excavated soil or removed during above grade demolition
- ND — Not detected
- ‡ — Sum of Aroclor-1248 and Aroclor-1260
- * — Aroclor-1248
- ** — Aroclor-1260
- PCBs — Polychlorinated Biphenyls (PCBs) reported in micrograms per kilogram (µg/kg)
- PCB-impacted concrete ≥ 5.3 mg/kg (Figure 4; July 2009 PCB Plan)

DIOXIN TEQs IN SOIL

Results shown in picograms per gram

Sample Location	Sample ID	Dioxin TEQ
#184	184-SS-01	0.29
#185	185-SS-01	0.18
#186	186-SS-01	0.25
#187	187-SS-01	17.7

TEQ = Toxic Equivalent

NOTES:

1. All locations are approximate.
2. Samples analyzed using EPA Methods 8080 and 8082.
3. No notation added to Aroclor-1016 results.
4. References:

A.J. Ursic, Jr., 1999, Aluminum Company of America Divestiture of The Alcoa Cast Plate Facility, Parcels 6, 7, and 8, Vernon, California, July 26.

A.J. Ursic, Jr., 1999, Aluminum Company of America Divestiture of The Alcoa Cast Plate Facility, Parcels 6, 7, and 8, Vernon, California, June 30.

AMEC Geomatrix Inc., 2009, Polychlorinated Biphenyls Notification Plan, Former Pechiney Cast Plate Inc., Facility, Vernon, California, July 10.

AMEC Geomatrix, Inc., 2009 (Revised), Feasibility Study, Former Pechiney Cast Plate, Inc., Facility, Vernon, California, September 24.

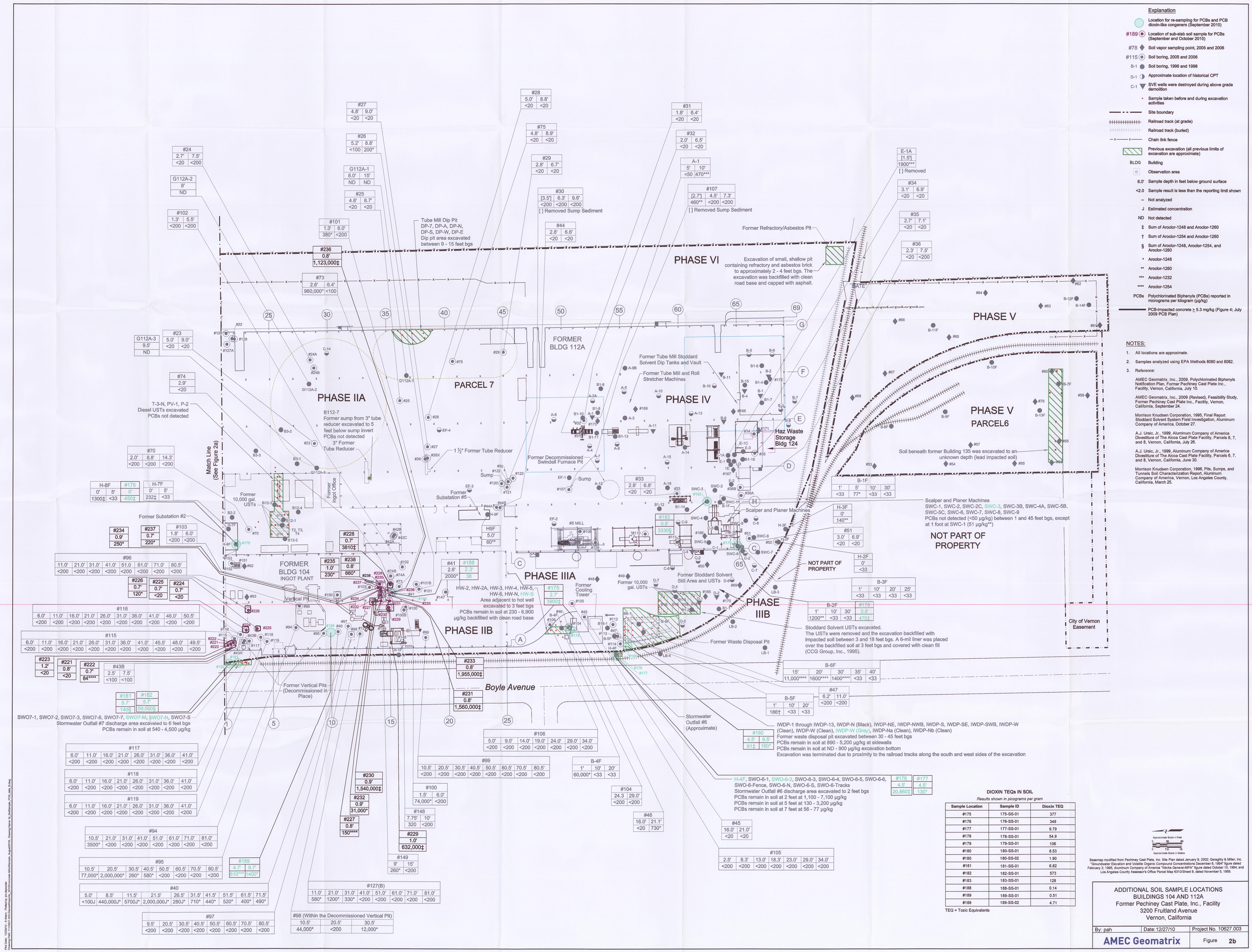
Morrison Knudsen Corporation, 1996, Pits, Sumps, and Tunnels Soil Characterization Report, Aluminum Company of America, Vernon, Los Angeles County, California, March 25.

Basemap modified from Pechiney Cast Plate, Inc. Site Plan dated January 9, 2002, Geraghty & Miller, Inc "Groundwater Elevation and Volatile Organic Compound Concentrations December 8, 1994" figure dated February 2, 1995, Aluminum Company of America "Vitrohs Generic-MPA" figure dated October 10, 1984, and Los Angeles County Assessor's Office Parcel Map 6013/Sheet 8, dated November 5, 1998.

ADDITIONAL SOIL SAMPLE LOCATIONS
FORMER BUILDINGS 106, 108, AND 112
Former Pechiney Cast Plate, Inc., Facility
3200 Fruitland Avenue
Vernon, California

By: pah	Date: 12/27/10	Project No. 10627.003
AMEC Geomatrix		Figure 2a

Plot Date - 12/28/10 // Plotted By - jim.dobovsky
File Name - N:\Projects\10627.003\Corrective Action\Corrective Action\Figure 2a\Figure 2a_PCB_data_A.dwg



Explanation

- Location for re-sampling for PCBs and PCB dioxin-like congeners (September 2010)
- #189 Location of sub-slab soil sample for PCBs (September and October 2010)
- #78 Soil vapor sampling point, 2005 and 2006
- #115 Soil boring, 2005 and 2006
- B-1 Soil boring, 1996 and 1998
- D-1 Approximate location of historical CPT
- C-1 SVE wells were destroyed during above grade demolition
- Sample taken before and during excavation activities
- Site boundary
- Railroad track (at grade)
- Railroad track (buried)
- Chain link fence
- Previous excavation (all previous limits of excavation are approximate)
- BLDG Building
- Observation area
- 6.0' Sample depth in feet below ground surface
- <2.0 Sample result is less than the reporting limit shown
- -- Not analyzed
- J Estimated concentration
- ND Not detected
- ‡ Sum of Aroclor-1248 and Aroclor-1260
- † Sum of Aroclor-1254 and Aroclor-1260
- § Sum of Aroclor-1248, Aroclor-1254, and Aroclor-1260
- * Aroclor-1248
- ** Aroclor-1260
- *** Aroclor-1232
- **** Aroclor-1254
- PCBs Polychlorinated Biphenyls (PCBs) reported in micrograms per kilogram (µg/kg)
- PCB-impacted concrete ≥ 5.3 mg/kg (Figure 4; July 2009 PCB Plan)

NOTES:

1. All locations are approximate.
2. Samples analyzed using EPA Methods 8080 and 8082.
3. Reference:

AMEC Geomatrix, Inc., 2009, Polychlorinated Biphenyls Notification Plan, Former Pechiney Cast Plate Inc., Facility, Vernon, California, July 10.

AMEC Geomatrix, Inc., 2009 (Revised), Feasibility Study, Former Pechiney Cast Plate Inc., Facility, Vernon, California, September 24.

Morrison Knudsen Corporation, 1995, Final Report Stoddard Solvent System Field Investigation, Aluminum Company of America, October 27.

A.J. Ursic, Jr., 1999, Aluminum Company of America Divestiture of The Alcoa Cast Plate Facility, Parcels 6, 7, and 8, Vernon, California, July 26.

A.J. Ursic, Jr., 1999, Aluminum Company of America Divestiture of The Alcoa Cast Plate Facility, Parcels 6, 7, and 8, Vernon, California, June 30.

Morrison Knudsen Corporation, 1996, Pits, Sumps, and Tunnels Soil Characterization Report, Aluminum Company of America, Vernon, Los Angeles County, California, March 25.

DIOXIN TEQs IN SOIL

Results shown in picograms per gram

Sample Location	Sample ID	Dioxin TEQ
#175	175-SS-01	377
#176	176-SS-01	349
#177	177-SS-01	9.79
#178	178-SS-01	54.9
#179	179-SS-01	106
#180	180-SS-01	8.53
#180	180-SS-02	1.90
#181	181-SS-01	6.82
#182	182-SS-01	573
#183	183-SS-01	128
#188	188-SS-01	0.14
#189	189-SS-01	0.51
#189	189-SS-02	4.71

TEQ = Toxic Equivalents

Approximate Scale in Feet: 0, 30, 60

Approximate Scale in Meters: 0, 7.5, 15

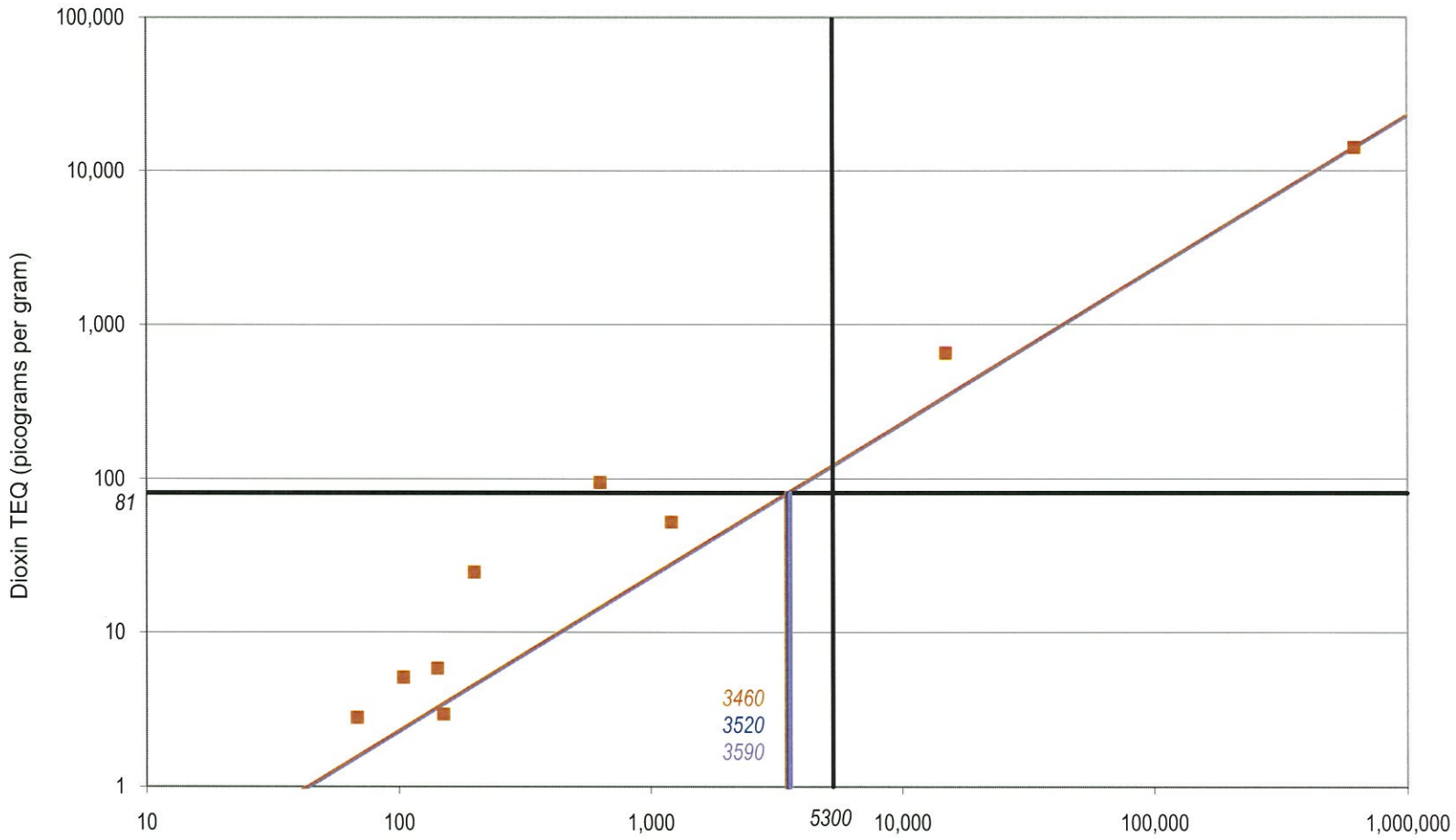
Basemap modified from Pechiney Cast Plate, Inc. Site Plan dated January 9, 2002; Geraghty & Miller, Inc. *Groundwater Elevation and Volatile Organic Compound Concentrations December 6, 1994* figure dated February 2, 1995, Aluminum Company of America "Works General-MPA" figure dated October 10, 1984; and Los Angeles County Assessor's Office Parcel Map 6310/Sheet 8, dated November 5, 1956.

ADDITIONAL SOIL SAMPLE LOCATIONS BUILDINGS 104 AND 112A

Former Pechiney Cast Plate, Inc., Facility
3200 Fruitland Avenue
Vernon, California

By: pah	Date: 12/27/10	Project No. 10627.003
AMEC Geomatrix	Figure	2b

Plot Date: 12/29/10 - 8:44am, Plotted by: jim.depooter
Drawing Path: Y:\10627.003\Deliverables\fs_2010\Concrete Abandonment_Aug2010\fs_2010Concrete Abandonment_Aug2010.dwg, Drawing Name: fs_2010sample (PCB).dwg



REGRESSION OF DIOXIN TEQ VS
TOTAL AROCLORS IN CONCRETE
UNTRANSFORMED DATA
Former Pechiney Cast Plate Inc., Facility
3200 Fruitland Avenue
Vernon, California

By: TB\pah	Date: 12/10/10	Project No.: 10627.003
AMEC Geomatrix		Figure 3

TABLES

TABLE 1
POLYCHLORINATED BIPHENYLS IN CONCRETE (SEPTEMBER - OCTOBER 2010)
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Results shown in micrograms per kilogram (µg/kg)

Sample Location	Sample ID	Phase Area	Sample Depth[1] (Feet)	Sample Date	EPA Method	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs (sum of Aroclors tested)	Data Source
C-12	C-12-A	I	0	09/15/10	8082	<20[2]	<20	<20	<20	110	<20	<20	110	AMEC Geomatrix
DC-154	DC-154-A	I	0	09/15/10	8082	<1000	<1000	<1000	<1000	12,000	<1000	1400	13,400	AMEC Geomatrix
DC-168	DC-168-C	I	0	09/15/10	8082	<20,000	<20,000	<20,000	<20,000	390,000	<20,000	200,000	590,000	AMEC Geomatrix
DC-168	DC-168-A/DC-168-B	I	0	09/15/10	8082	<20,000	<20,000	<20,000	<20,000	160,000	<20,000	40,000	200,000	AMEC Geomatrix
DC-205	DC-205-A	I	0	09/14/10	8082	<20	<20	<20	<20	41	<20	31	72	AMEC Geomatrix
DC-206	DC-206-A	I	0	09/14/10	8082	<20	<20	<20	<20	50	<20	26	76	AMEC Geomatrix
DC-207	DC-207-A	I	0	09/14/10	8082	<1000	<1000	<1000	<1000	2300	<1000	<1000	2300	AMEC Geomatrix
DC-208	DC-208-A	I	0	09/14/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	AMEC Geomatrix
DC-209	DC-209-A	I	0	09/14/10	8082	<20	<20	<20	<20	20	<20	<20	20	AMEC Geomatrix
DC-210	DC-210-A	I	0	09/15/10	8082	<20	<20	<20	<20	29	<20	<20	29	AMEC Geomatrix
DC-211	DC-211-A	I	0	09/14/10	8082	<100	<100	<100	<100	1400	<100	780	2180	AMEC Geomatrix
DC-212	DC-212-A	I	0	09/14/10	8082	<20	<20	<20	<20	43	<20	<20	43	AMEC Geomatrix
DC-213	DC-213-A	I	0	09/15/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	AMEC Geomatrix
DC-214	DC-214-A1	I	0	09/14/10	8082	<20	<20	<20	<20	220	<20	43	263	AMEC Geomatrix
DC-215	DC-215-A	I	0	09/14/10	8082	<20	<20	<20	<20	140	<20	31	171	AMEC Geomatrix
DC-216	DC-216-A	I	0	09/15/10	8082	<200	<200	<200	<200	1900	<200	720	2620	AMEC Geomatrix
DC-217	DC-217-A	I	0	09/13/10	8082	<20	<20	<20	<20	<20	230	130	360	AMEC Geomatrix
DC-218	DC-218-A	I	0	09/13/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	AMEC Geomatrix
DC-263	DC-263-A	I	0	10/15/10	8082	<100	<100	<100	<100	1000	<100	120	1120	AMEC Geomatrix
DC-264	DC-264-A	I	0	10/15/10	8082	<400	<400	<400	<400	3800	5400	2200	11,400	AMEC Geomatrix
DC-265	DC-265-A	I	0	10/15/10	8082	<200	<200	<200	<200	380	690	340	1410	AMEC Geomatrix
DC-266	DC-266-A	I	0	10/15/10	8082	<400	<400	<400	<400	4100	5800	2200	12,100	AMEC Geomatrix
DC-267	DC-267-A	I	0	10/18/10	8082	<200	<200	<200	<200	770	<200	370	1140	AMEC Geomatrix
DC-268	DC-268-A	I	0	10/18/10	8082	<200	<200	<200	<200	540	<200	200	740	AMEC Geomatrix
DC-269	DC-269-A	I	0	10/18/10	8082	<20	<20	<20	<20	34	<20	24	58	AMEC Geomatrix
DC-270	DC-270-A	I	0	10/18/10	8082	<200	<200	<200	<200	1000	2700	1000	4700	AMEC Geomatrix
DC-271	DC-271-A	I	0	10/18/10	8082	<200	<200	<200	<200	310	<200	<200	310	AMEC Geomatrix
DC-272	DC-272-A	I	0	10/18/10	8082	<200	<200	<200	<200	650	<200	<200	650	AMEC Geomatrix
DC-273	DC-273-A	I	0	10/18/10	8082	<200	<200	<200	<200	420	<200	<200	420	AMEC Geomatrix
DC-274	DC-274-A	I	0	10/18/10	8082	<200	<200	<200	<200	460	<200	<200	460	AMEC Geomatrix

TABLE 1
POLYCHLORINATED BIPHENYLS IN CONCRETE (SEPTEMBER - OCTOBER 2010)
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Results shown in micrograms per kilogram (µg/kg)

Sample Location	Sample ID	Phase Area	Sample Depth[1] (Feet)	Sample Date	EPA Method	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs (sum of Aroclors tested)	Data Source
DC-275	DC-275-A	I	0	10/18/10	8082	<200	<200	<200	<200	1300	<200	440	1740	AMEC Geomatrix
DC-276	DC-276-A	I	0	10/18/10	8082	<20,000	<20,000	<20,000	<20,000	99,000	<20,000	<20,000	99,000	AMEC Geomatrix
C-14	C-14-A	IIA/IIB	0	09/15/10	8082	<20	<20	<20	<20	38	<20	74	112	AMEC Geomatrix
DC-22	DC-22-A	IIA/IIB	0	09/15/10	8082	<20	<20	<20	<20	39	<20	130	169	AMEC Geomatrix
DC-23	DC-23-A	IIA/IIB	0	09/15/10	8082	<20	<20	<20	<20	370	<20	810	1180	AMEC Geomatrix
DC-52	DC-52-A	IIA/IIB	0	09/15/10	8082	<20	<20	<20	<20	41	<20	33	74	AMEC Geomatrix
DC-219	DC-219-A	IIA/IIB	0	09/13/10	8082	<20	<20	<20	<20	38	<20	<20	38	AMEC Geomatrix
DC-220	DC-220-A	IIA/IIB	0	09/14/10	8082	<20	<20	<20	<20	97	100	96	293	AMEC Geomatrix
DC-221	DC-221-A	IIA/IIB	0	09/14/10	8082	<20	<20	<20	<20	97	<20	61	158	AMEC Geomatrix
DC-222	DC-222-A	IIA/IIB	0	09/13/10	8082	<20	<20	<20	<20	22	<20	29	51	AMEC Geomatrix
DC-223	DC-223-A	IIA/IIB	0	09/13/10	8082	<20	<20	<20	<20	1300	<20	96	1396	AMEC Geomatrix
DC-224	DC-224-A	IIA/IIB	0	09/13/10	8082	<20	<20	<20	<20	<20	<20	20	20	AMEC Geomatrix
DC-225	DC-225-A	IIA/IIB	0	09/10/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	AMEC Geomatrix
DC-226	DC-226-A1	IIA/IIB	0	09/10/10	8082	<20	<20	<20	<20	<20	<20	28	28	AMEC Geomatrix
DC-227	DC-227-A	IIA/IIB	0	09/13/10	8082	<20	<20	<20	<20	<20	260	150	410	AMEC Geomatrix
DC-228	DC-228-A	IIA/IIB	0	09/13/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	AMEC Geomatrix
DC-229	DC-229-A	IIA/IIB	0	09/13/10	8082	<20	<20	<20	<20	39	<20	50	89	AMEC Geomatrix
DC-230	DC-230-A	IIA/IIB	0	09/10/10	8082	26	<20	<20	<20	36	<20	42	104	AMEC Geomatrix
DC-231	DC-231-A	IIA/IIB	0	09/10/10	8082	<20	<20	<20	<20	20	<20	20	40	AMEC Geomatrix
DC-236	DC-236-A	IIA/IIB	0	09/10/10	8082	<20	<20	<20	<20	<20	<20	24	24	AMEC Geomatrix
DC-246	DC-246-A	IIA/IIB	0	09/13/10	8082	<20	<20	<20	<20	<20	57	39	96	AMEC Geomatrix
DC-247	DC-247-A	IIA/IIB	0	09/13/10	8082	<20	<20	<20	<20	28	<20	62	90	AMEC Geomatrix
DC-248	DC-248-A	IIA/IIB	0	09/13/10	8082	<1000	<1000	<1000	<1000	65,000	<1000	2800	67,800	AMEC Geomatrix
DC-249	DC-249-A1	IIA/IIB	0	09/15/10	8082	<20	<20	<20	<20	45	<20	<20	45	AMEC Geomatrix
DC-250	DC-250-A	IIA/IIB	0	09/14/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	AMEC Geomatrix
DC-251	DC-251-A	IIA/IIB	0	09/14/10	8082	<20	<20	<20	<20	77	<20	45	122	AMEC Geomatrix
DC-252	DC-252-A	IIA/IIB	0	09/14/10	8082	<20	<20	<20	<20	44	<20	20	64	AMEC Geomatrix
DC-253	DC-253-A	IIA/IIB	0	09/13/10	8082	<20	<20	<20	<20	<20	<20	25	25	AMEC Geomatrix
DC-254	DC-254-A	IIA/IIB	0	09/13/10	8082	<20	<20	<20	<20	40	<20	<20	40	AMEC Geomatrix
DC-255	DC-255-A	IIA/IIB	0	10/15/10	8082	<200	<200	<200	<200	1600	<200	150	1750	AMEC Geomatrix

TABLE 1
POLYCHLORINATED BIPHENYLS IN CONCRETE (SEPTEMBER - OCTOBER 2010)
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Results shown in micrograms per kilogram (µg/kg)

Sample Location	Sample ID	Phase Area	Sample Depth[1] (Feet)	Sample Date	EPA Method	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs (sum of Aroclors tested)	Data Source
DC-256	DC-256-A	IIA/IIB	0	10/15/10	8082	<20	<20	<20	<20	310	<20	72	382	AMEC Geomatrix
DC-257	DC-257-A	IIA/IIB	0	10/15/10	8082	<40	<40	<40	<40	210	<40	61	271	AMEC Geomatrix
DC-258	DC-258-A	IIA/IIB	0	10/15/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	AMEC Geomatrix
DC-259	DC-259-A	IIA/IIB	0	10/15/10	8082	<20	<20	<20	<20	24	<20	61	85	AMEC Geomatrix
DC-260	DC-260-A	IIA/IIB	0	10/15/10	8082	<200	<200	<200	<200	1800	<200	<200	1800	AMEC Geomatrix
DC-261	DC-261-A	IIA/IIB	0	10/15/10	8082	<20	<20	<20	<20	56	<20	<20	56	AMEC Geomatrix
DC-262	DC-262-A	IIA/IIB	0	10/15/10	8082	<200	<200	<200	<200	280	<200	<200	280	AMEC Geomatrix
B-1	B-1-A1	IV	0	09/15/10	8082	<20	<20	<20	<20	320	<20	280	600	AMEC Geomatrix
DC-25	DC-25-A	IV	0	09/15/10	8082	<20	<20	<20	<20	<20	<20	28	28	AMEC Geomatrix
DC-232	DC-232-A	IV	0	09/10/10	8082	<20	<20	<20	<20	<20	1000	<20	1000	AMEC Geomatrix
DC-233	DC-233-A	IV	0	09/10/10	8082	<20	<20	<20	<20	53	<20	260	313	AMEC Geomatrix
DC-234	DC-234-A	IV	0	09/09/10	8082	<20	<20	<20	<20	<20	<20	40	40	AMEC Geomatrix
DC-235	DC-235-A	IV	0	09/10/10	8082	320	<200	<200	<200	<200	<200	210	530	AMEC Geomatrix
DC-237	DC-237-A	IV	0	09/09/10	8082	<20	<20	<20	<20	<20	<20	86	86	AMEC Geomatrix
DC-238	DC-238-A	IV	0	09/09/10	8082	<20	<20	<20	<20	<20	<20	40	40	AMEC Geomatrix
DC-239	DC-239-A	IV	0	09/09/10	8082	27	<20	<20	<20	<20	<20	65	92	AMEC Geomatrix
DC-240	DC-240-A	IV	0	09/09/10	8082	<200	<200	<200	<200	<200	<200	<200	<200	AMEC Geomatrix
DC-241	DC-241-A	IV	0	09/09/10	8082	<20	<20	<20	<20	<20	<20	20	20	AMEC Geomatrix
DC-242	DC-242-A	IV	0	09/09/10	8082	<20	<20	<20	<20	<20	<20	24	24	AMEC Geomatrix
DC-243	DC-243-A	IV	0	09/09/10	8082	<20	<20	<20	<20	<20	<20	23	23	AMEC Geomatrix
DC-244	DC-244-A	IV	0	09/09/10	8082	41	<20	<20	<20	58	<20	82	181	AMEC Geomatrix
DC-245	DC-245-A	IV	0	09/10/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	AMEC Geomatrix

Notes:
1. Depth = top of sample depth measured in feet below ground surface.
2. < = not detected at or above the reporting limit shown.

Data Source:
AMEC Geomatrix = "B", "C", and "DC" concrete samples collected during PCB characterization and verification sampling.

TABLE 2
POLYCHLORINATED BIPHENYLS IN SOIL (SEPTEMBER - OCTOBER 2010)
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Results shown in micrograms per kilogram (µg/kg)

Sample	Phase Area	Sample Depth[1]	Sample Date	EPA Method	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs (sum of Aroclors tested)	Excavated Status[2]	Data Source
Industrial PRGs					21,246	NE[3]	NE	NE	NE	744	NE	NE	--	--
184-SS-01	I	1.7	09/13/10	8082	<20[4]	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
185-SS-01	I	2.4	09/13/10	8082	<20	<20	<20	<20	190	<20	<20	190	--	AMEC Geomatrix
187-SS-01	I	1.8	09/14/10	8082	<20	<20	<20	<20	47	<20	51	98	--	AMEC Geomatrix
190-SS-01	I	0.9	09/24/10	8082	<20	<20	<20	<20	80	<20	<20	80	--	AMEC Geomatrix
191-SS-01	I	1.0	09/24/10	8082	<1000	<1000	<1000	<1000	**11,000**	<1000	<1000	**11,000**	--	AMEC Geomatrix
192-SS-01	I	0.9	09/24/10	8082	<20	<20	<20	<20	23	<20	<20	23	--	AMEC Geomatrix
193-SS-01	I	1.0	09/24/10	8082	<100,000	<100,000	<100,000	<100,000	**1,000,000**	<100,000	<100,000	**1,000,000**	--	AMEC Geomatrix
194-SS-01	I	0.9	09/24/10	8082	<400	<400	<400	<400	450	<400	<400	450	--	AMEC Geomatrix
195-SS-01	I	0.9	09/24/10	8082	<10,000	<10,000	<10,000	<10,000	**94,000**	<10,000	<10,000	**94,000**	--	AMEC Geomatrix
196-SS-01	I	0.8	09/24/10	8082	<20	<20	<20	<20	730	<20	150	**880**	--	AMEC Geomatrix
197-SS-01	I	0.9	09/24/10	8082	<100	<100	<100	<100	390	<100	<100	390	--	AMEC Geomatrix
198-SS-01	I	0.9	09/24/10	8082	<40	<40	<40	<40	190	<40	<40	190	--	AMEC Geomatrix
199-SS-01	I	0.9	09/24/10	8082	<40	<40	<40	<40	160	<40	110	270	--	AMEC Geomatrix
200-SS-01	I	1.0	09/24/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
201-SS-01	I	1.0	09/24/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
202-SS-01	I	1.2	09/24/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
203-SS-01	I	1.1	09/24/10	8082	250	<40	<40	<40	<40	<40	<40	250	--	AMEC Geomatrix
204-SS-01	I	0.9	09/24/10	8082	<200	<200	<200	<200	**1800**	<200	<200	**1800**	--	AMEC Geomatrix
205-SS-01	I	0.9	09/24/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
206-SS-01	I	0.9	09/24/10	8082	<200	<200	<200	<200	**1100**	<200	<200	**1100**	--	AMEC Geomatrix
208-SS-01	I	1.2	09/23/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
209-SS-01	I	1.2	09/23/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
210-SS-01	I	1.1	09/23/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
211-SS-01	I	1.8	09/23/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
212-SS-01	I	1.2	09/23/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
213-SS-01	I	1.0	09/24/10	8082	<100	<100	<100	<100	240	<100	<100	240	--	AMEC Geomatrix
214-SS-01	I	0.9	09/23/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
215-SS-01	I	1.1	09/23/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
216-SS-01	I	1.2	09/23/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
217-SS-01	I	1.2	09/23/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
218-SS-01	I	1.2	09/23/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
219-SS-01	I	1.2	09/23/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
220-SS-01	I	1.2	09/23/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
178-SS-01	IIA/IIB	0	09/13/10	8082	<20	<20	<20	<20	270	<20	180	450	--	AMEC Geomatrix
181-SS-01	IIA/IIB	5.7	09/13/10	8082	<20	<20	<20	<20	54	56	30	140	--	AMEC Geomatrix
182-SS-01	IIA/IIB	5.7	09/13/10	8082	<1000	<1000	<1000	<1000	**14,000**	**19,000**	**26,000**	**59,000**	--	AMEC Geomatrix
188-SS-01	IIA/IIB	2.3	09/13/10	8082	38	<20	<20	<20	<20	<20	<20	38	--	AMEC Geomatrix
189-SS-01	IIA/IIB	4.7	09/14/10	8082	<20	<20	610	<20	<20	<20	<20	610	--	AMEC Geomatrix
189-SS-02	IIA/IIB	9.7	09/14/10	8082	<100	<100	<100	<100	**1400**	<100	<100	**1400**	--	AMEC Geomatrix

TABLE 2
POLYCHLORINATED BIPHENYLS IN SOIL (SEPTEMBER - OCTOBER 2010)
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Results shown in micrograms per kilogram (µg/kg)

Sample	Phase Area	Sample Depth[1]	Sample Date	EPA Method	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs (sum of Aroclors tested)	Excavated Status[2]	Data Source
Industrial PRGs					21,246	NE[3]	NE	NE	NE	744	NE	NE	--	--
221-SS-01	IIA/IIB	0.8	09/23/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
222-SS-01	IIA/IIB	0.7	09/23/10	8082	<20	<20	<20	<20	<20	84	<20	84	--	AMEC Geomatrix
223-SS-01	IIA/IIB	1.2	09/23/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
224-SS-01	IIA/IIB	0.7	09/23/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
225-SS-01	IIA/IIB	0.7	09/23/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix
226-SS-01	IIA/IIB	0.7	09/23/10	8082	<20	<20	<20	<20	120	<20	<20	120	--	AMEC Geomatrix
227-SS-01	IIA/IIB	0.8	09/23/10	8082	<20	<20	<20	<20	<20	150	<20	150	--	AMEC Geomatrix
228-SS-01	IIA/IIB	0.7	09/23/10	8082	<100	<100	<100	<100	**3200**	<100	610	**3810**	--	AMEC Geomatrix
229-SS-01	IIA/IIB	1.0	09/23/10	8082	<10,000	<10,000	<10,000	<10,000	**610,000**	<10,000	**22,000**	**632,000**	--	AMEC Geomatrix
230-SS-01	IIA/IIB	0.9	09/24/10	8082	<10,000	<10,000	<10,000	<10,000	**1,500,000**	<10,000	**40,000**	**1,540,000**	--	AMEC Geomatrix
231-SS-01	IIA/IIB	0.8	09/24/10	8082	<10,000	<10,000	<10,000	<10,000	**1,500,000**	<10,000	**60,000**	**1,560,000**	--	AMEC Geomatrix
232-SS-01	IIA/IIB	0.9	09/24/10	8082	<4000	<4000	<4000	<4000	**31,000**	<4000	<4000	**31,000**	--	AMEC Geomatrix
233-SS-01	IIA/IIB	0.8	09/24/10	8082	<10,000	<10,000	<10,000	<10,000	**1,900,000**	<10,000	**55,000**	**1,955,000**	--	AMEC Geomatrix
234-SS-01	IIA/IIB	0.9	09/24/10	8082	<20	<20	<20	<20	250	<20	<20	250	--	AMEC Geomatrix
235-SS-01	IIA/IIB	1.0	09/24/10	8082	<20	<20	<20	<20	230	<20	<20	230	--	AMEC Geomatrix
236-SS-01	IIA/IIB	0.8	09/24/10	8082	<10,000	<10,000	<10,000	<10,000	**1,100,000**	<10,000	**23,000**	**1,123,000**	--	AMEC Geomatrix
237-SS-01	IIA/IIB	0.7	09/24/10	8082	<20	<20	<20	<20	220	<20	<20	220	--	AMEC Geomatrix
238-SS-01	IIA/IIB	0.8	09/24/10	8082	<100	<100	<100	<100	660	<100	<100	660	--	AMEC Geomatrix
175-SS-01	IIIA	2.7	09/13/10	8082	<20	<20	<20	<20	**3400**	<20	500	**3900**	--	AMEC Geomatrix
175-SS-01[5]	IIIA	2.7	09/13/10	8082	<200	<200	<200	<200	**3500**	**3900**	720	**8120**	--	AMEC Geomatrix
175-SS-01[5]	IIIA	2.7	09/13/10	8082	<200	<200	<200	<200	**3900**	**3900**	**780**	**8580**	--	AMEC Geomatrix
176-SS-01	IIIA	4.5	09/14/10	8082	<100	<100	<100	<100	**20,000**	<100	**860**	**20,860**	--	AMEC Geomatrix
177-SS-01	IIIA	4.5	09/14/10	8082	<20	<20	<20	<20	130	<20	<20	130	--	AMEC Geomatrix
180-SS-01	IIIA	4.5	09/14/10	8082	<20	<20	<20	<20	65	<20	26	91	--	AMEC Geomatrix
180-SS-02	IIIA	9.5	09/14/10	8082	<20	<20	<20	<20	160	<20	<20	160	--	AMEC Geomatrix
179-SS-01	IV	0.8	09/13/10	8082	<100	<100	<100	<100	130	<100	340	470	--	AMEC Geomatrix
183-SS-01	IV	0.8	09/13/10	8082	<20	<20	<20	<20	680	**2300**	350	**3330**	--	AMEC Geomatrix
183-SS-01[5]	IV	0.8	09/13/10	8082	<200	<200	<200	<200	680	**2000**	380	**3060**	--	AMEC Geomatrix
183-SS-01[5]	IV	0.8	09/13/10	8082	<200	<200	<200	<200	650	**2200**	410	**3260**	--	AMEC Geomatrix
186-SS-01	VI	2.0	09/14/10	8082	<20	<20	<20	<20	<20	<20	<20	<20	--	AMEC Geomatrix

Notes
1. Depth = top of sample depth measured in feet below ground surface.
2. Samples which have been previously excavated are listed "excavated".
3. NE = not established.
4. < = not detected at or above the reporting limit shown.
5. Samples were reanalyzed to verify concentrations of PCB aroclors in primary samples. Samples were analyzed past the EPA-recommended hold time.

Data Source
AMEC Geomatrix = soil samples collected during additional PCB sampling outlined in the Sampling and Analysis Plan.

TABLE 3

DIOXIN-LIKE POLYCHLORINATED BIPHENYL (PCB) CONGENERS IN CONCRETE

Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Concentrations reported in picograms per gram (pg/g)

Sample Location	Sample ID	Phase Area	Sample Depth[1]	Sample Date	PCB 77	PCB 81	PCB 105	PCB 114	PCB 118	PCB 123	PCB 126	PCB 156, 157	PCB 167	PCB 169	PCB 189	Dioxin TEQ[2]
				WHO 2005 TEF[3]	0.0001	0.0003	0.00003	0.00003	0.00003	0.00003	0.1	0.00003	0.00003	0.03	0.00003	--[4]
C-12	C-12-A	I	0	09/15/10	190	<11.7[5]	825	<45.5	1440	<39.5	<52.6	143	49.0	<15.9	19.9	2.96
DC-154	DC-154-A	I	0	09/15/10	119,000	4660	457,000	28,900	703,000	11,500	5960	44,700	13,200	<564	2630	656
DC-168	DC-168-C	I	0	09/15/10	2,730,000	164,000	10,500,000	842,000	18,100,000	560,000	124,000	1,530,000	509,000	<37,214	302,000	14,250
C-14	C-14-A	IIA/IIB	0	09/15/10	131	<29.2	420	<72.4	920	<59.9	<100	242	98.6	<53.3	45.6	5.87
DC-22	DC-22-A	IIA/IIB	0	09/15/10	1010	<413	3310	<440	7990	405	<339	1300	1020	238	535	24.7
DC-23	DC-23-A	IIA/IIB	0	09/15/10	4060	<1546	13,900	<1109	26,200	<1135	<842	4340	2740	<536	1030	52.3
DC-52	DC-52-A	IIA/IIB	0	09/15/10	659	<59.3	2220	99.3	2990	104	<82.4	216	136	<50.5	41.7	5.13
B-1	B-1-A4[6]	IV	0	09/15/10	4600	<2171	14,600	<1746	25,200	<1546	<1647	1700	<1000	<677	<581	94.6
DC-25	DC-25-A	IV	0	09/15/10	77.9	<32.6	260	<46.8	389	<39.3	<45.1	<46.6	58	<34.8	28.5	2.81

Notes:

1. Depth = top of sample depth measured in feet below ground surface.
2. TEQ = Toxic Equivalent. Dioxin TEQ concentrations are calculated as the sum of the concentration of each dioxin-like PCB congener times the congener-specific toxic equivalency factor (TEF). The dioxin-like PCB congener concentrations in concrete and TEFs are listed above. Results below the reporting limit are represented by a value of one half the reporting limit in the dioxin TEQ concentration calculations.
3. WHO 2005 TEF = World Health Organization toxicity equivalency factors (TEF), released in 2005, but published in 2006 by Van den Berg, M. et al. ("The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds," Toxicological Sciences, 93[2]: 223-241, October).
4. -- = not applicable.
5. < = not detected at or above the reporting limit shown.
6. Samples B-1-A1, B-1-A4, and B-1-A5 were collected from the same area. Of the three samples, sample B-1-A4 was selected by SGS for analysis of PCB congeners.

TABLE 4

DIOXIN-LIKE POLYCHLORINATED BIPHENYL (PCB) CONGENERS IN SOIL

Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Concentrations reported in picograms per gram (pg/g)

Sample Location	Sample ID	Phase Area	Sample Depth[1]	Sample Date	PCB 77	PCB 81	PCB 105	PCB 114	PCB 118	PCB 123	PCB 126	PCB 156, 157	PCB 167	PCB 169	PCB 189	Dioxin TEQ[2]
				WHO 2005 TEF[3]	0.0001	0.0003	0.00003	0.00003	0.00003	0.00003	0.1	0.00003	0.00003	0.03	0.00003	--[4]
#184	184-SS-01	I	1.7	09/13/10	4.18	<2.37[5]	36.6	<4.33	75.4	<3.59	<4.44	28.2	9.91	<4.28	2.82	0.29
#185	185-SS-01	I	2.4	09/13/10	5.74	<5.18	40.2	5.85	176	5.74	<2.72	6.58	<2.77	<2.39	1.25	0.18
#187	187-SS-01	I	1.8	09/14/10	<60.1	<55.0	2200	<216	2740	<227	<306	4760	1540	<139	176	17.7
#178	178-SS-01	IIA/IIB	0	09/13/10	11,900	<698	44,200	1060	75,200	8030	<925	7250	2450	<216	487	54.9
#181	181-SS-01	IIA/IIB	5.7	09/13/10	959	43.3	3620	253	5950	141	61.0	597	191	9.68	66.7	6.82
#182	182-SS-01	IIA/IIB	5.7	09/13/10	131,000	<15,391	565,000	25,400	1,030,000	22,400	<8373	157,000	56,300	<5493	23,100	573
#188	188-SS-01	IIA/IIB	2.3	09/13/10	26.5	<2.60	99.0	6.87	156	4.03	<2.16	7.68	2.73	<1.09	<1.12	0.14
#189	189-SS-01	IIA/IIB	4.7	09/14/10	41.9	<10.7	94.0	<8.38	198	<6.87	<8.89	8.55	<3.44	<3.30	<2.00	0.51
#189	189-SS-02	IIA/IIB	9.7	09/14/10	690	<87.7	33,900	1170	31,800	1040	<47.6	931	169	<11.5	6.57	4.71
#175	175-SS-01	IIIA	2.7	09/13/10	51,500	3130	246,000	18,700	320,000	7200	3450	20,900	5760	252	1210	377
#176	176-SS-01	IIIA	4.5	09/14/10	102,000	4230	322,000	23,000	446,000	13,400	3090	22,000	6090	103	937	349
#177	177-SS-01	IIIA	4.5	09/14/10	4080	<112	9320	503	14,200	368	85.5	464	127	<4.26	17.4	9.79
#180	180-SS-01	IIIA	4.5	09/14/10	1020	39.5	3570	232	6250	117	79.1	644	163	<11.4	36.1	8.53
#180	180-SS-02	IIIA	9.5	09/14/10	382	16.4	1140	84.1	2150	50.4	17.1	128	37.3	<2.64	6.30	1.90
#179	179-SS-01	IV	0.8	09/13/10	<1984	<1837	4220	<1834	6710	<1630	<1716	<1470	<1316	<1296	<967	106
#183	183-SS-01	IV	0.8	09/13/10	32,200	1160	111,000	6490	169,000	4620	1140	8740	2310	49.2	516	128
#186	186-SS-01	VI	2.0	09/14/10	15.4	<4.97	40.4	<4.58	60.9	<4.31	<4.32	5.27	1.97	<1.58	<1.17	0.25

Notes:

1. Depth = top of sample depth measured in feet below ground surface.
2. TEQ = Toxic Equivalent. Dioxin TEQ concentrations are calculated as the sum of the concentration of each dioxin-like PCB congener times the congener-specific toxic equivalency factor (TEF). The dioxin-like PCB congener concentrations in soil and TEFs are listed above. Results below the reporting limit are represented by a value of one half the reporting limit in the dioxin TEQ concentration calculations.
3. WHO 2005 TEF = World Health Organization toxicity equivalency factors (TEF), released in 2005, but published in 2006 by Van den Berg, M. et al. ("The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds," Toxicological Sciences, 93(2): 223-241, October).
4. -- = not applicable.
5. < = not detected at or above the reporting limit shown.

TABLE 5

EXPOSURE PARAMETERS USED IN DEVELOPING RISK-BASED SCREENING LEVELS FOR PCBs FOR OUTDOOR COMMERCIAL/INDUSTRIAL WORKERS

Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Exposure Parameter	Units	Reasonable Maximum Exposure
GENERAL EXPOSURE PARAMETERS		
Exposure Frequency (EF)	days/year	Value: 250 Rationale: DTSC, 2005
Exposure Duration (ED)	years	Value: 25 Rationale: DTSC, 2005
Body Weight (BW)	kg	Value: 70 Rationale: DTSC, 2005
Averaging Time (AT)	days	Value: 25,550 (carcinogens) 9,125 (noncarcinogens) Rationale: DTSC, 2005
PATHWAY-SPECIFIC PARAMETERS		
Incidental Soil Ingestion		
Soil Ingestion Rate (IR_s)	mg/day	Value: 100 Rationale: DTSC, 2005
Dermal Contact with Soil		
Exposed Skin Surface Area (SA_s)	cm^2/day	Value: 5,700 Rationale: DTSC, 2005; assumes head, hands, forearms, and lower legs are exposed
Soil-to-Skin Adherence Factor (SAF)	mg/cm^2	Value: 0.2 Rationale: DTSC, 2005
Absorption Fraction (ABS)	unitless	Value: 0.15 Rationale: DTSC, 2005; chemical-specific value

TABLE 5

EXPOSURE PARAMETERS USED IN DEVELOPING RISK-BASED SCREENING LEVELS FOR PCBs FOR OUTDOOR COMMERCIAL/INDUSTRIAL WORKERS

Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Exposure Parameter	Units	Reasonable Maximum Exposure
Inhalation of Suspended Soil Particulates		
Inhalation Rate (IHR_a)	m^3/day	Value: 14 Rationale: DTSC, 2005; for an 8-hour workday
Particulate Emission Factor (PEF)	m^3/kg	Value: $1.316x10^9$ Rationale: DTSC, 2005

Abbreviations:
cm^2/day = centimeters squared per day
kg = kilograms
m^3/day = cubic meters per day
m^3/kg = cubic meters per kilogram
mg/cm^2 = milligrams per squared centimeters
mg/day = milligrams per day

References:

Department of Toxic Substances Control (DTSC), 2005, Recommended DTSC Default Exposure Factors for Use In Risk Assessment at California Military Facilities, Human and Ecological Risk Division (HERD), HERD HHRA Note Number 1, October 27.

TABLE 6

EXPOSURE PARAMETERS USED IN DEVELOPING RISK-BASED SCREENING LEVELS FOR PCBs FOR CONSTRUCTION WORKERS

Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Exposure Parameter	Units	Reasonable Maximum Exposure
GENERAL EXPOSURE PARAMETERS		
Exposure Frequency (EF)	days/year	Value: 250 Rationale: DTSC, 2005
Exposure Duration (ED)	years	Value: 1 Rationale: DTSC, 2005
Body Weight (BW)	kg	Value: 70 Rationale: DTSC, 2005
Averaging Time (AT)	days	Value: 25,550 (carcinogens) 365 (noncarcinogens) Rationale: DTSC, 2005
Pathway-Specific Parameters		
Incidental Soil Ingestion		
Soil Ingestion Rate (IR_s)	mg/day	Value: 330 Rationale: DTSC, 2005
Dermal Contact with Soil		
Exposed Skin Surface Area (SA_s)	cm^2	Value: 5,700 Rationale: DTSC, 2005; assumes head, hands, forearms, and lower legs are exposed
Soil-to-Skin Adherence Factor (SAF)	mg/cm^2	Value: 0.8 Rationale: DTSC, 2005
Absorption Fraction (ABSds)	unitless	Value: 0.15 Rationale: DTSC, 2005; chemical-specific value

TABLE 6

EXPOSURE PARAMETERS USED IN DEVELOPING RISK-BASED SCREENING LEVELS FOR PCBs FOR CONSTRUCTION WORKERS

Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Exposure Parameter	Units	Reasonable Maximum Exposure
Inhalation of Suspended Soil Particulates		
Inhalation Rate (IHR_a)	m^3/day	Value: 20 Rationale: DTSC, 2005; for an 8-hour workday
Particulate Emission Factor (PEF)	m^3/kg	Value: $1.0x10^6$ Rationale: DTSC, 2005

Abbreviations:
cm^2/day = centimeters squared per day
kg = kilograms
m^3/day = cubic meters per day
m^3/kg = cubic meters per kilogram
mg/cm^2 = milligrams per squared centimeters
mg/day = milligrams per day

References:

Department of Toxic Substances Control (DTSC), 2005, Recommended DTSC Default Exposure Factors for Use In Risk Assessment at California Military Facilities, Human and Ecological Risk Division (HERD), HERD HHRA Note Number 1, October 27.

TABLE 7

RISK-BASED SCREENING LEVELS[1] FOR AROCLOR-1016 AND THE DIOXIN-LIKE PCB CONGENERS

Former Pechiney Cast Plate, Inc., Facility
Vernon, California

CAS No.	Chemical	Oral Cancer Slope Factor (CSF_o)[2] (mg/kg-day)$^{-1}$	Inhalation Cancer Slope Factor (CSF_i)[2] (mg/kg-day)$^{-1}$	Oral Reference Dose ($RfDo$)[3] (mg/kg-day)	Inhalation Reference Dose ($RfDi$)[3] (mg/kg-day)	RISK-BASED SCREENING LEVELS (RBSLs), SOIL			
						Outdoor Commercial/Industrial Worker		Construction Worker	
						Cancer (mg/kg)	Noncancer (mg/kg)	Cancer (mg/kg)	Noncancer (mg/kg)
12674112	Aroclor-1016	2	2	7.0E-05	7.0E-05	5.3E-01	2.6E+01	3.5E+00	6.9E+00
32598133	PCB 77	13	13	1.0E-05	1.1E-04	8.1E-02	3.8E+00	5.3E-01	1.0E+00
70362504	PCB 81	39	39	3.3E-06	3.8E-05	2.7E-02	1.3E+00	1.8E-01	3.4E-01
32598144	PCB 105	3.9	3.9	3.3E-05	3.8E-04	2.7E-01	1.3E+01	1.8E+00	3.4E+00
74472370	PCB 114	3.9	3.9	3.3E-05	3.8E-04	2.7E-01	1.3E+01	1.8E+00	3.4E+00
31508006	PCB 118	3.9	3.9	3.3E-05	3.8E-04	2.7E-01	1.3E+01	1.8E+00	3.4E+00
65510443	PCB 123	3.9	3.9	3.3E-05	3.8E-04	2.7E-01	1.3E+01	1.8E+00	3.4E+00
57465288	PCB 126	13000	13000	1.0E-08	1.1E-07	8.1E-05	3.8E-03	5.3E-04	1.0E-03
38380084[4]	PCB 156, 157	3.9	3.9	3.3E-05	3.8E-04	2.7E-01	1.3E+01	1.8E+00	3.4E+00
52663726	PCB 167	3.9	3.9	3.3E-05	3.8E-04	2.7E-01	1.3E+01	1.8E+00	3.4E+00
32774166	PCB 169	3900	3900	3.3E-08	3.8E-07	2.7E-04	1.3E-02	1.8E-03	3.4E-03
39635319	PCB 189	3.9	3.9	3.3E-05	3.8E-04	2.7E-01	1.3E+01	1.8E+00	3.4E+00
1746016	Dioxin-like PCB congeners (TEQ)	130000	130000	1.0E-09	1.1E-08	8.1E-06	3.8E-04	5.3E-05	1.0E-04

Notes:

1. Risk-based screening levels (RBSL) calculated following the methodology described in the PCB Notification Plan (AMEC, 2009a), and per the equations provided below.
2. CSFos and CSFis for Aroclor-1016 and dioxin TEQ obtained from OEHHA Toxicity Criteria Database (OEHHA, 2010). CSFos and CSFis for dioxin-like PCB congeners calculated by multiplying the CSFo and CSFi for dioxin TEQ by the congener-specific WHO 2005 TEFs presented in Tables 3 and 4.
3. RfDo for Aroclor-1016 obtained from U.S. EPA Integrated Risk Information System (IRIS) Database (U.S. EPA, 2010b). RfDi for Aroclor-1016 route-extrapolated from RfDo as recommended by Department of Toxic Substances Control (DTSC) (2009).
   RfDo for dioxin TEQ obtained from Agency for Toxic Substances Disease Registry (ATSDR), as cited in the U.S. EPA Regional Screening Levels Table (U.S. EPA, 2010c). RfDi calculated from reference concentration (RfC) provided by OEHHA/ARB (2010).
   RfDis and RfDos for dioxin-like PCB congeners calculated by multiplying the RfDo and RfDi for dioxin TEQ by the congener-specific WHO 2005 TEFs presented in Tables 3 and 4.
4. CAS No. for PCB 156.

Abbreviations:

CAS No. = chemical abstract service number

mg/kg = milligrams per kilogram

mg/kg-day = milligrams per kilogram - day

Equations:

$$RBSL_{soil-cancer} = \frac{TR \times BW \times AT_{ca}}{ED \times EF \times \left[\left(\frac{IR_s \times CSF_o}{CF_{kg-mg}}\right) + \left(\frac{SAs \times SAF \times ABS \times CSF_o}{CF_{kg-mg}}\right) + \left(\frac{IHR_a \times CSF_i}{PEF}\right)\right]}$$

$$RBSL_{soil-noncancer} = \frac{THQ \times BW \times AT_{nc}}{ED \times EF \times \left[\left(\frac{1}{RfD_o} \times \frac{IR_s}{CF_{kg-mg}}\right) + \left(\frac{1}{RfD_o} \times \frac{SAs \times SAF \times ABS}{CF_{kg-mg}}\right) + \left(\frac{1}{RfD_i} \times \frac{IHR_a}{PEF}\right)\right]}$$

TABLE 8

REGRESSION ANALYSIS STATISTICS -
DIOXIN TEQ VS. TOTAL PCBs (as Aroclors)
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Regression	Number of Data Points	Slope of Regression Line	Intercept of Regression Line	Ratio of Dioxin TEQ to Total Aroclor Concentration (pg/g)/(µg/kg)			Total Aroclor Concentration Corresponding to 81 pg/g Dioxin TEQ[4]			F-Statistic	Critical Value of F for α = 0.05	Statistical Significance of F Statistic[5]
				95% UCL	Regression	95% LCL	95% UCL	Regression	95% LCL			
Untransformed Data												
Concrete	9	0.0230[1]	0	0.0234	0 0230	0.0226	3,460	3,520	3,590	15437	5.32	5.77×10^{-13}
Soil	17	0.0107[1]	0	0 014	0 0107	0.00748	5,800	7,500	10,800	48.8	4.49	4.40×10^{-6}
Combined Soil and Concrete	26	0.0229[1]	0	0.0235	0 0229	0.0223	3,450	3,540	3,640	5874	4.24	3.33×10^{-30}
Log-Transformed Data												
Concrete	9	0.933[2]	-2.59[3]	NA	NA	NA	1,110	1,770	2,960	132	5.59	$8\ 56 \times 10^{-6}$
Soil	17	1.08[2]	-4.62[3]	NA	NA	NA	1,850	4,380	20,100	22.9	4.54	2.49×10^{-4}
Combined Soil and Concrete	26	1.03[2]	-3.92[3]	NA	NA	NA	1,870	3,350	7,270	56.4	4.26	9.48×10^{-8}

Notes
1. Slope of the regression line has the units picograms per gram per microgram per kilogram ([pg/g]\[µg/kg]).
2. Slope of the regression line in the log-transformed domain (dimensionless).
3. Intercept of the regression line in the log-transformed domain (dimensionless).
4. Concentration in micrograms per kilogram (µg/kg).
5. Smaller values of the statistical significance correspond to greater strength for the regression.

Abbreviations
NA = Not applicable. The ratio of dioxin TEQ to total Aroclors cannot be estimated using a regression of log-transformed data.

TABLE 9

POTENTIAL HUMAN HEALTH RISKS FROM DIOXIN-LIKE PCB CONGENERS VERSUS PCBS AS AROCLOR MIXTURES

Former Pechiney Cast Plate, Inc., Facility
Vernon, California

	Dioxin-Like PCB Congeners Concentrations reported in picograms per gram (pg/g)												Aroclor Mixtures Concentrations reported in micrograms per kilogram (µg/kg)				
Sample ID	**PCB 77**	**PCB 81**	**PCB 105**	**PCB 114**	**PCB 118**	**PCB 123**	**PCB 126**	**PCB 156, 157**	**PCB 167**	**PCB 169**	**PCB 189**	**Dioxin TEQ**	**Aroclor 1016**	**Aroclor 1232**	**Aroclor 1248**	**Aroclor 1254**	**Aroclor 1260**
Concrete Samples																	
B-1-A	4600	<2171[1]	14600	<1746	25200	<1546	<1647	1700	<1000	<677	<581	94.6	<20	<20	320	<20	280
C-12-A	190	<11.7	825	<45.5	1440	<39.5	<52.6	143	49	<15.9	19.9	2 96	<20	<20	110	<20	<20
C-14-A	131	<29.2	420	<72.4	920	<59.9	<100	242	98.6	<53.3	45.6	5 87	<20	<20	38	<20	74
DC-22-A	1010	<413	3310	<440	7990	405	<339	1300	1020	238	535	24.7	<20	<20	39	<20	130
DC-23-A	4060	<1546	13900	<1109	26200	<1135	<842	4340	2740	<536	1030	52.3	<20	<20	370	<20	810
DC-25-A	77 9	<32.6	260	<46.8	389	<39.3	<45.1	<46.6	58	<34.8	28.5	2 81	<20	<20	<20	<20	28
DC-52-A	659	<59.3	2220	99.3	2990	104	<82.4	216	136	<50.5	41.7	5.13	<20	<20	41	<20	33
DC-154-A	119000	4660	457000	28900	703000	11500	5960	44700	13200	<564	2630	656	<1000	<1000	12000	<1000	1400
DC-168-C	2730000	164000	10500000	842000	18100000	560000	124000	1530000	509000	<37214	302000	14250	<20000	<20000	390000	<20000	200000
Soil Samples																	
175-SS-01	51500	3130	246000	18700	320000	7200	3450	20900	5760	252	1210	377	<20	<20	3400	<20	500
176-SS-01	102000	4230	322000	23000	446000	13400	3090	22000	6090	103	937	349	<100	<100	20000	<100	860
177-SS-01	4080	<112	9320	503	14200	368	85.5	464	127	<4 26	17.4	9.79	<20	<20	130	<20	<20
178-SS-01	11900	<698	44200	1060	75200	8030	<925	7250	2450	<216	487	54.9	<20	<20	270	<20	180
179-SS-01	<1984	<1837	4220	<1834	6710	<1630	<1716	<1470	<1316	<1296	<967	106	<100	<100	130	<100	340
180-SS-01	1020	39 5	3570	232	6250	117	79.1	644	163	<11.4	36.1	8 53	<20	<20	65	<20	26
180-SS-02	382	16.4	1140	84.1	2150	50.4	17.1	128	37.3	<2 64	6 3	1 9	<20	<20	160	<20	<20
181-SS-01	959	43 3	3620	253	5950	141	61	597	191	9.68	66.7	6 82	<20	<20	54	56	30
182-SS-01	131000	<15391	565000	25400	1030000	22400	<8373	157000	56300	<5493	23100	573	<1000	<1000	14000	19000	26000
183-SS-01	32200	1160	111000	6490	169000	4620	1140	8740	2310	49.2	516	128	<20	<20	680	2300	350
184-SS-01	4.18	<2.37	36 6	<4.33	75.4	<3 59	<4.44	28.2	9.91	<4 28	2.82	0.29	<20	<20	<20	<20	<20
185-SS-01	5.74	<5.18	40 2	5.85	176	5.74	<2.72	6.58	<2.77	<2 39	1.25	0.18	<20	<20	190	<20	<20
186-SS-01	15.4	<4.97	40.4	<4.58	60.9	<4 31	<4 32	5.27	1.97	<1 58	<1.17	0.25	<20	<20	<20	<20	<20
187-SS-01	<60.1	<55	2200	<216	2740	<227	<306	4760	1540	<139	176	17.7	<20	<20	47	<20	51
188-SS-01	26 5	<2 6	99	6.87	156	4.03	<2.16	7.68	2.73	<1 09	<1.12	0.14	38	<20	<20	<20	<20
189-SS-01	41 9	<10.7	94	<8 38	198	<6 87	<8 89	8.55	<3.44	<3.3	<2	0.51	<20	610	<20	<20	<20
189-SS-02	690	<87.7	33900	1170	31800	1040	<47.6	931	169	<11.5	6.57	4.71	<100	1400	<100	<100	<100
UCL[2]	1164970	18126	4475566	362353	7706713	240452	13793	654961	218436	130	128797	6070	NA	716.4	166689	2460	86419
EPC[3]	1,200,000	18,000	4,500,000	360,000	7,700,000	240,000	14,000	650,000	220,000	130	130,000	6,100	38	720	170,000	2,500	86,000
Outdoor Commercial/ Industrial Worker Cancer-Based RBSL[4]	81,000	27,000	270,000	270,000	270,000	270,000	81	270,000	270,000	270	270,000	8.1	530	530	530	530	530
Predicted Lifetime Excess Cancer Risk - Outdoor Commercial/ Industrial Worker[5]	1 5E-05	6.7E-07	1.7E-05	1.3E-06	2.9E-05	8.9E-07	1.7E-04	2.4E-06	8.1E-07	4.8E-07	4.8E-07	7.5E-04	7 2E-08	1.4E-06	3.2E-04	4.7E-06	1 6E-04
									Cumulative Risk		**2E-04**	**8E-04**			**Cumulative Risk**		**5E-04**

Notes:

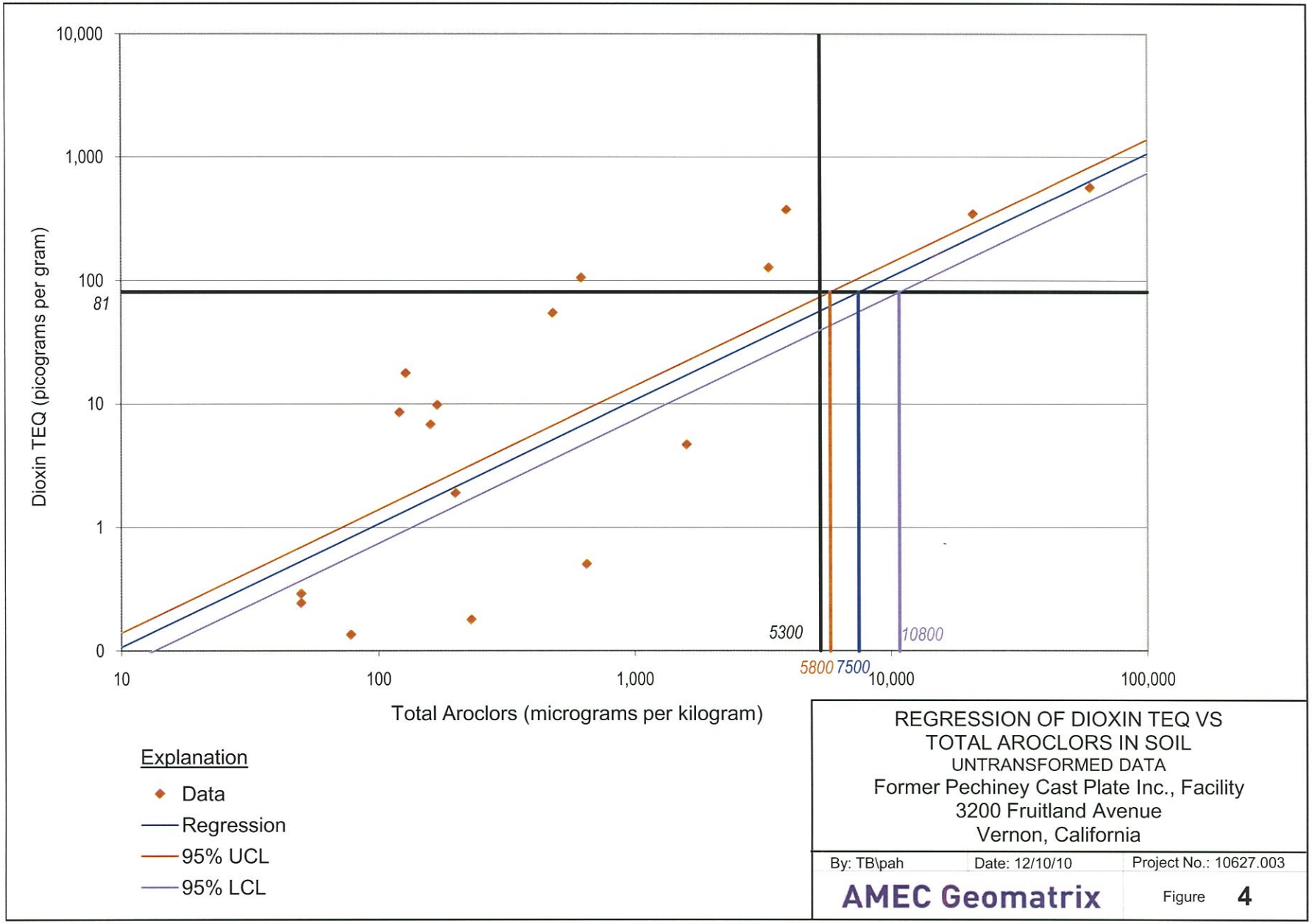
1. < = not detected at or above the reporting limit shown.
2. Upper confidence limit (UCL) concentration of the mean, calculated using U.S. EPA's ProUCL product (U.S. EPA, 2010d). ProUCL output provided in Supplement A.
3. Exposure point concentration selected as the lower of the maximum detected concentration and the UCL concentration of the mean (rounded to two significant figures).
4. Cancer-based risk-based screening levels (RBSLs) for outdoor commercial/industrial workers provided in Table 7.
5. Predicted lifetime excess cancer risks estimated by dividing each EPC by the cancer-based RBSL, and then multiplying the risk ratio by the target risk level of the RBSL (i.e., $1x10^{-6}$).

Abbreviations:

EPC = exposure point concentration
NA = Not applicable. UCL concentration not calculated for Aroclor 1016 (only one detected concentration).
UCL = Upper Confidence Limit

FIGURES

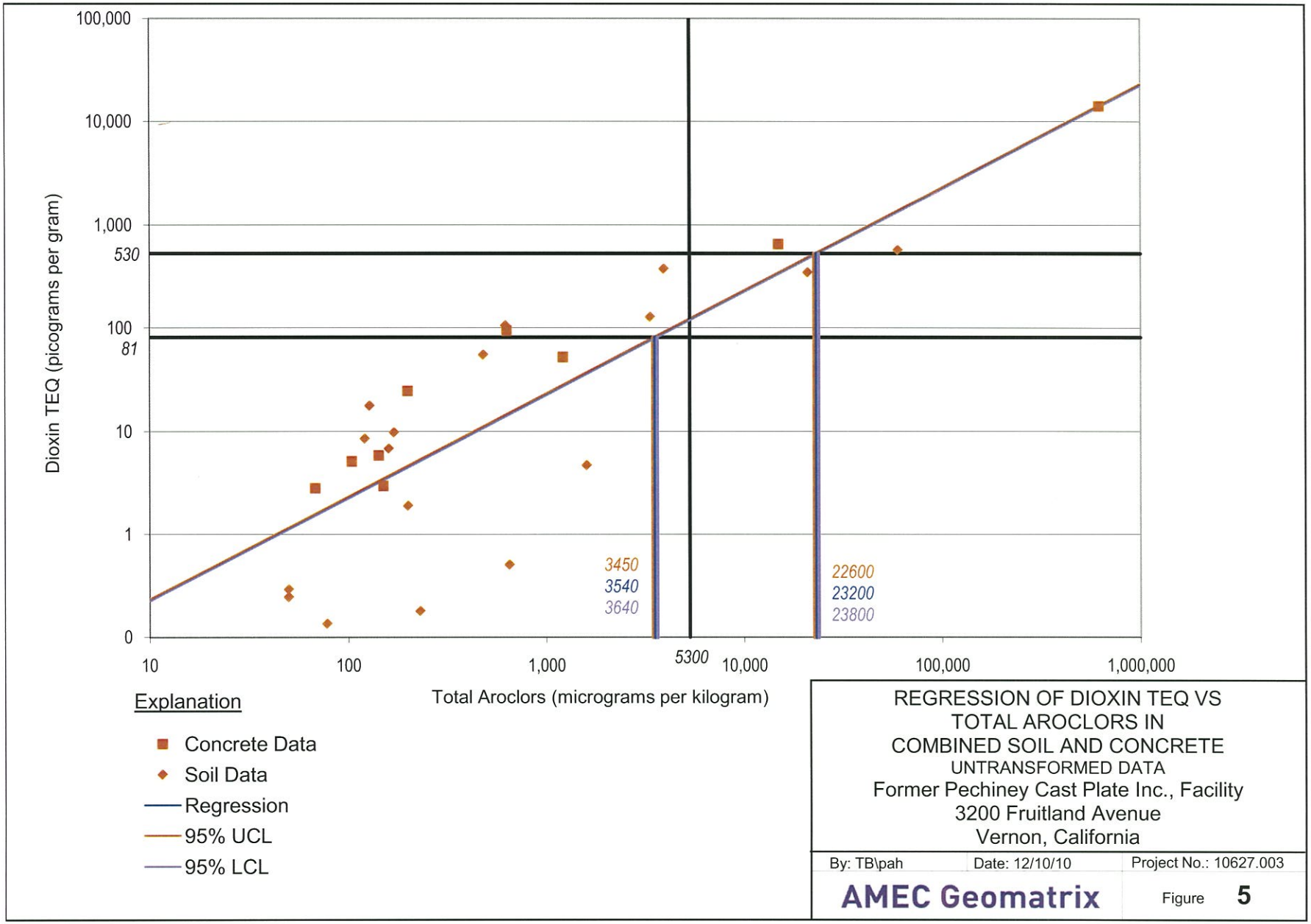
Y:\10627.003.0\acad\Reports_2010\Concrete &SoilSample_August2010\Figure 4&7 DioxinTEQcalcs_soil corrected 20101130.xlsFigure 4 PCB Raw Data 12/9/2010



REGRESSION OF DIOXIN TEQ VS
TOTAL AROCLORS IN SOIL
UNTRANSFORMED DATA
Former Pechiney Cast Plate Inc., Facility
3200 Fruitland Avenue
Vernon, California

By: TB\pah	Date: 12/10/10	Project No.: 10627.003
AMEC Geomatrix		Figure 4

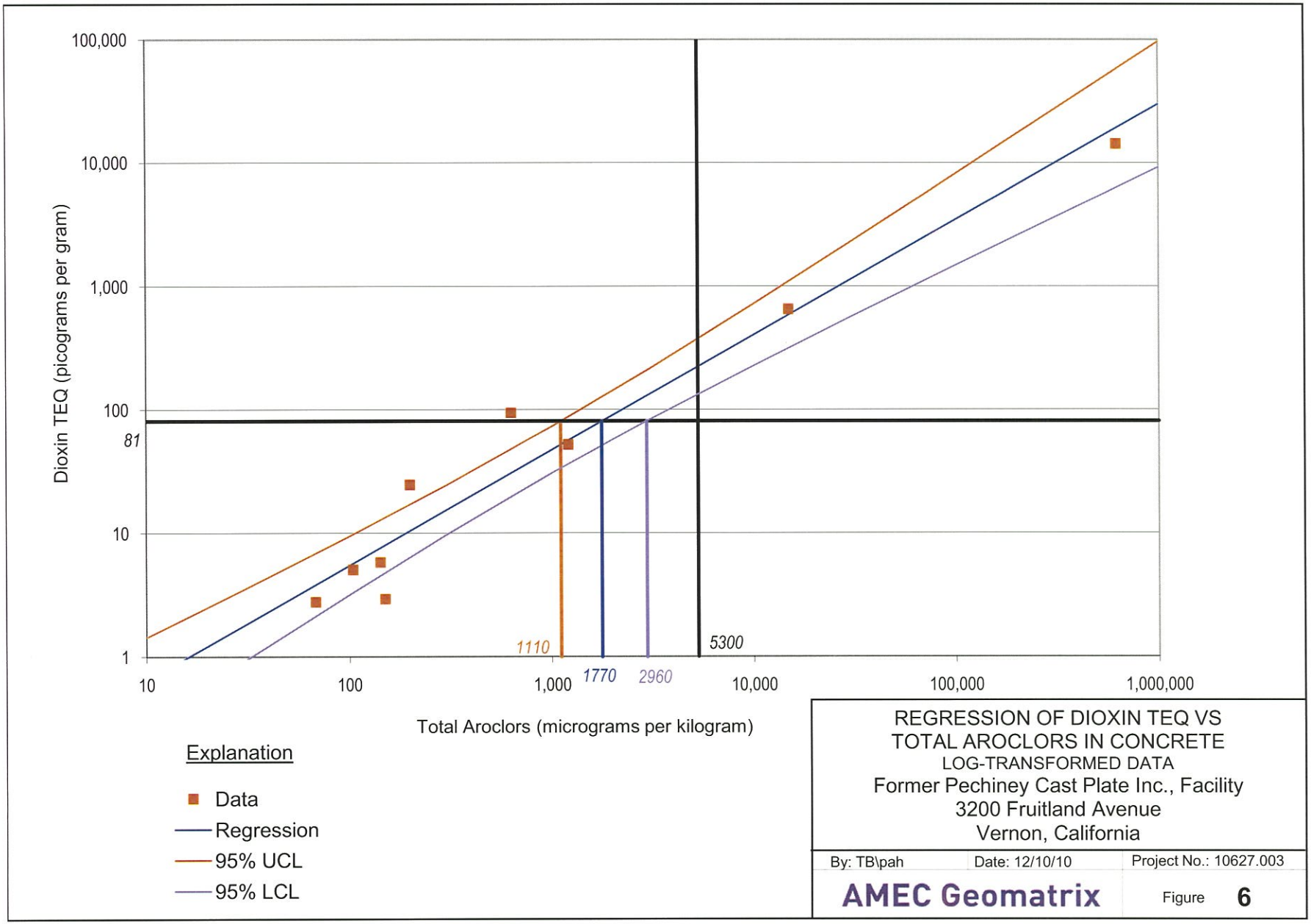
Y:\10627.003.0\acad\Reports_2010\Concrete &SoilSample_August2010\Figures 5&8 DioxinTEQcalcs_combined soil & concrete 20101130.xlsFigure 5 PCB Raw Data 12/9/2010



REGRESSION OF DIOXIN TEQ VS
TOTAL AROCLORS IN
COMBINED SOIL AND CONCRETE
UNTRANSFORMED DATA
Former Pechiney Cast Plate Inc., Facility
3200 Fruitland Avenue
Vernon, California

By: TB\pah	Date: 12/10/10	Project No.: 10627.003
AMEC Geomatrix		Figure 5

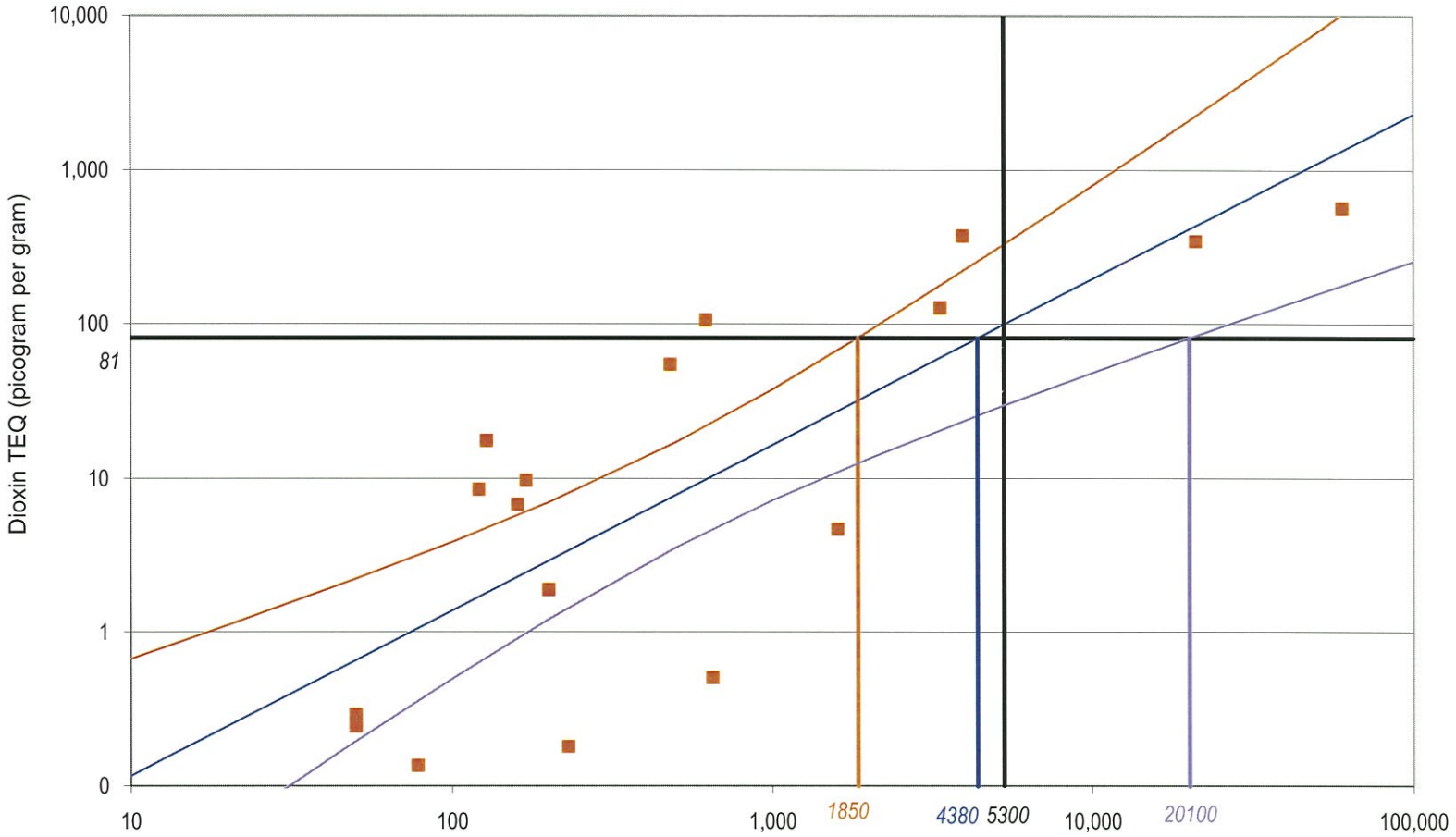
Y:\10627.003.0\acad\Reports_2010\Concrete &SoilSample_August2010\Figure 3&6 DioxinTEQcalcs_concrete corrected 20101130.xlsFigure 6 PCB Data LOG 12/9/2010



REGRESSION OF DIOXIN TEQ VS
TOTAL AROCLORS IN CONCRETE
LOG-TRANSFORMED DATA
Former Pechiney Cast Plate Inc., Facility
3200 Fruitland Avenue
Vernon, California

By: TB\pah	Date: 12/10/10	Project No.: 10627.003
AMEC Geomatrix		Figure 6

Y:\10627.003.0\acad\Reports_2010\Concrete &SoilSample_August2010\Figure 4&7 DioxinTEQcalcs_soil corrected 20101130.xlsFigure 7 PCB LOG Data 12/9/2010



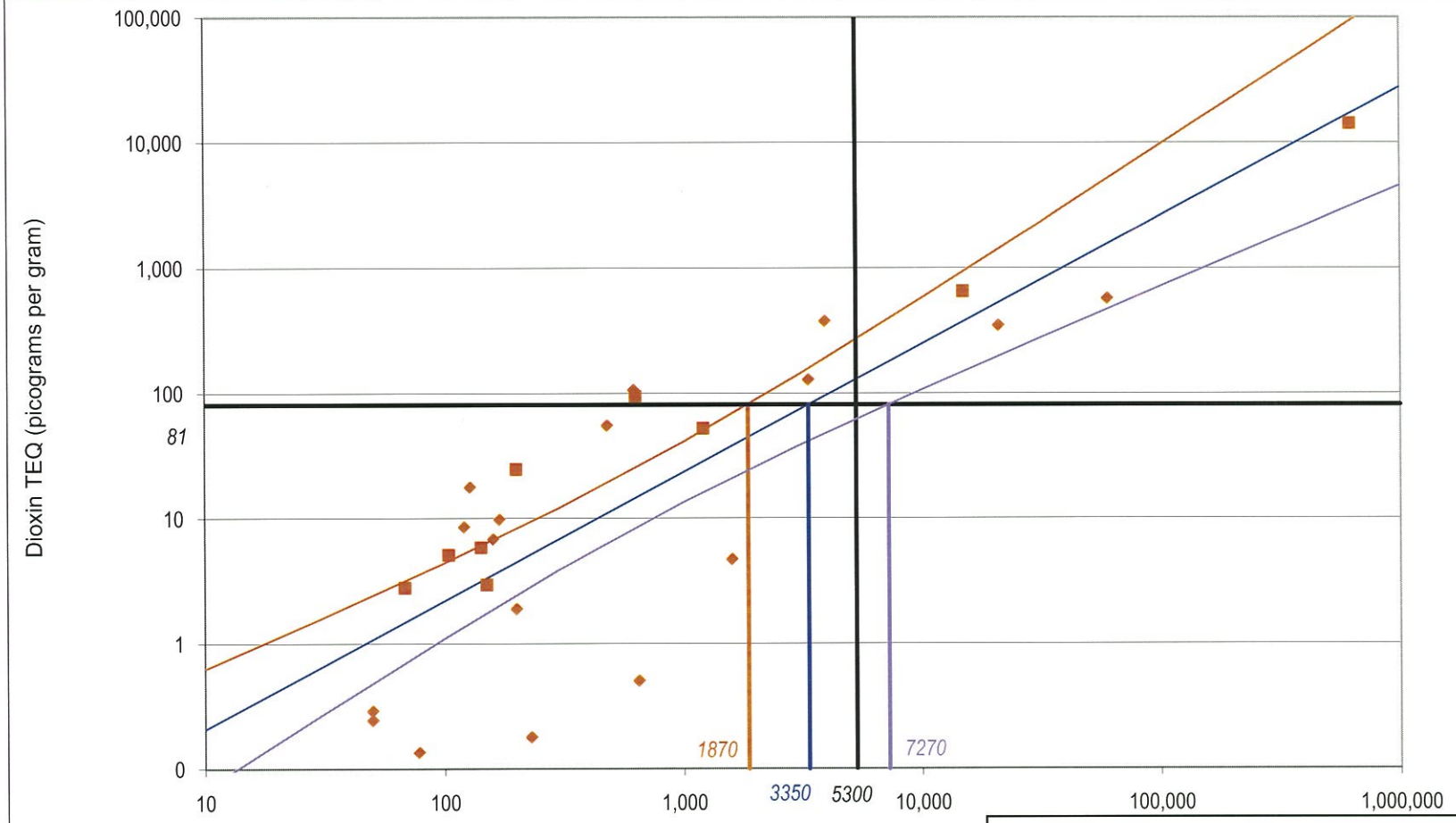
Explanation

- Data
- Regression
- 95% UCL
- 95% LCL

REGRESSION OF DIOXIN TEQ VS
TOTAL AROCLORS IN SOIL
LOG-TRANSFORMED DATA
Former Pechiney Cast Plate Inc., Facility
3200 Fruitland Avenue
Vernon, California

By: TB\pah	Date: 12/10/10	Project No.: 10627.003
AMEC Geomatrix		Figure 7

Y:\10627.003.0\acad\Reports_2010\Concrete &SoilSample_August2010\Figures 5&8 DioxinTEQcalcs_combined soil & concrete 20101130.xlsFigure 8 PCB Log Data 12/9/2010



REGRESSION OF DIOXIN TEQ VS
TOTAL AROCLORS IN
COMBINED SOIL AND CONCRETE
LOG-TRANSFORMED DATA
Former Pechiney Cast Plate Inc., Facility
3200 Fruitland Avenue
Vernon, California

By: TB\pah	Date: 12/10/10	Project No.: 10627.003
AMEC Geomatrix		Figure 8

SUPPLEMENT A

SUPPLEMENT A

ProUCL OUTPUT, COMBINED CONCRETE AND SOIL DATA

Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Concentrations in picograms per gram (pg/g)

Dioxin TEQ

General Statistics			
Number of Valid Observations	26	Number of Distinct Observations	2600.00%
Raw Statistics		Log-transformed Statistics	
Minimum	0.14	Minimum of Log Data	-1.966
Maximum	14250	Maximum of Log Data	9.565
Mean	643.6	Mean of log Data	2.668
Median	9.16	SD of log Data	2.895
SD	2781		
Coefficient of Variation	4.321		
Skewness	5.065		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wi k Test Statistic	0.241	Shapiro Wilk Test Statistic	0.97
Shapiro Wi k Critical Value	0.92	Shapiro Wilk Critical Value	0.92
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distr bution		Assuming Lognormal Distr bution	
95% Student's-t UCL	1575	95% H-UCL	23216
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2188
95% Adjusted-CLT UCL (Chen-1995)	2120	97.5% Chebyshev (MVUE) UCL	2911
95% Modified-t UCL (Johnson-1978)	1666	99% Chebyshev (MVUE) UCL	4331
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.198	Data appear Lognormal at 5% Significance Level	
Theta Star	3254		
MLE of Mean	643.6		
MLE of Standard Deviation	1447		
nu star	10.28		
Approximate Chi Square Value (.05)	4.12	Nonparametric Statistics	
Adjusted Level of Significance	0.0398	95% CLT UCL	1541
Adjusted Chi Square Value	3.864	95% Jackknife UCL	1575
		95% Standard Bootstrap UCL	1523
Anderson-Darling Test Statistic	2.399	95% Bootstrap-t UCL	13204
Anderson-Darling 5% Critical Value	0.896	95% Hall's Bootstrap UCL	9062
Kolmogorov-Smirnov Test Statistic	0.234	95% Percentile Bootstrap UCL	1721
Kolmogorov-Smirnov 5% Critical Value	0.19	95% BCA Bootstrap UCL	2328
Data not Gamma Distr buted at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	3021
		97.5% Chebyshev(Mean, Sd) UCL	4050
Assuming Gamma Distr bution		99% Chebyshev(Mean, Sd) UCL	6070
95% Approximate Gamma UCL	1607		
95% Adjusted Gamma UCL	1713		
Potential UCL to Use		Use 99% Chebyshev (Mean, Sd) UCL	6070

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

SUPPLEMENT A

ProUCL OUTPUT, COMBINED CONCRETE AND SOIL DATA
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Concentrations in picograms per gram (pg/g)

PCB 77

General Statistics			
Number of Valid Data	26	Number of Detected Data	24
Number of Distinct Detected Data	24	Number of Non-Detect Data	2
		Percent Non-Detects	7.69%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	4.18	Minimum Detected	1.43
Maximum Detected	2730000	Maximum Detected	14.82
Mean of Detected	133148	Mean of Detected	7.191
SD of Detected	554548	SD of Detected	3.493
Minimum Non-Detect	60.1	Minimum Non-Detect	4.096
Maximum Non-Detect	1984	Maximum Non-Detect	7.593
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	16
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	10
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	61.54%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.252	Shapiro Wilk Test Statistic	0.976
5% Shapiro Wilk Critical Value	0.916	5% Shapiro Wilk Critical Value	0.916
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	122945	Mean	7.034
SD	533123	SD	3.432
95% DL/2 (t) UCL	301538	95% H-Stat (DL/2) UCL	34161125
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	6.929
		SD in Log Scale	3.493
		Mean in Original Scale	122912
		SD in Original Scale	533131
		95% t UCL	301508
		95% Percentile Bootstrap UCL	328128
		95% BCA Bootstrap UCL	441151
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.172	Data appear Lognormal at 5% Significance Level	
Theta Star	775311		
nu star	8.243		
A-D Test Statistic	2.009	Nonparametric Statistics	
5% A-D Critical Value	0.909	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.909	Mean	122920
5% K-S Critical Value	0.198	SD	522776
Data not Gamma Distributed at 5% Significance Level		SE of Mean	104730
		95% KM (t) UCL	301814
Assuming Gamma Distribution		95% KM (z) UCL	295185
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	301515
Minimum	1.00E-12	95% KM (bootstrap t) UCL	2284932
Maximum	2730000	95% KM (BCA) UCL	340969
Mean	122906	95% KM (Percentile Bootstrap) UCL	325858
Median	824.5	95% KM (Chebyshev) UCL	579427
SD	533133	97.5% KM (Chebyshev) UCL	776958
k star	0.124	99% KM (Chebyshev) UCL	1164970
Theta star	991365		
Nu star	6.447	**Potential UCLs to Use**	
AppChi2	1.872	**99% KM (Chebyshev) UCL**	**1164970**
95% Gamma Approximate UCL	423199		
95% Adjusted Gamma UCL	462165		
Note: DL/2 is not a recommended method.			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

SUPPLEMENT A

ProUCL OUTPUT, COMBINED CONCRETE AND SOIL DATA
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Concentrations in picograms per gram (pg/g)

PCB 81

General Statistics			
Number of Valid Data	26	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	18
		Percent Non-Detects	69 23%
Raw Statistics		Log-transformed Statis ics	
Minimum Detected	16.4	Minimum Detected	2.797
Maximum Detected	164000	Maximum Detected	12 01
Mean of Detected	22160	Mean of Detected	6.769
SD of Detected	57344	SD of Detected	3.136
Minimum Non-Detect	2.37	Minimum Non-Detect	0.863
Maximum Non-Detect	15391	Maximum Non-Detect	9.642
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	25
For all methods (except KM, DL/2, and ROS Me hods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.15%

Warning: There are only 8 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.448	Shapiro Wilk Test Statistic	0.916
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Me hod	
Mean	7251	Mean	4.633
SD	32026	SD	3.068
95% DL/2 (t) UCL	17979	95% H-Stat (DL/2) UCL	403312
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE me hod failed to converge properly		Mean in Log Scale	1.631
		SD in Log Scale	3.946
		Mean in Original Scale	6819
		SD in Original Scale	32086
		95% t UCL	17568
		95% Percentile Bootstrap UCL	19395
		95% BCA Bootstrap UCL	25746
Gamma Distribution Test with Detected Values Only		Data Distribution Test wi h Detected Values Only	
k star (bias corrected)	0.223	Data Follow Appr. Gamma Distribu ion at 5% Significance Level	
Theta Star	99389		
nu star	3.567		
A-D Test Sta is ic	0.718	Nonparametric Statistics	
5% A-D Cri ical Value	0.827	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.827	Mean	6860
5% K-S Critical Value	0.322	SD	31455
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	6595
		95% KM (t) UCL	18126
Assuming Gamma Distribution		95% KM (z) UCL	17708
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	17594
Minimum	16.4	95% KM (bootstrap t) UCL	216854
Maximum	164000	95% KM (BCA) UCL	19490
Mean	22531	95% KM (Percentile Bootstrap) UCL	19378
Median	22207	95% KM (Chebyshev) UCL	35608
SD	30366	97.5% KM (Chebyshev) UCL	48047
k star	0.571	99% KM (Chebyshev) UCL	72481
Theta star	39430		
Nu star	29.71	**Potential UCLs to Use**	
AppChi2	18.27	**95% KM (t) UCL**	**18126**
95% Gamma Approximate UCL	36648		
95% Adjusted Gamma UCL	37878		
Note: DL/2 is not a recommended method.			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommenda ions are based upon the results of he simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

SUPPLEMENT A

ProUCL OUTPUT, COMBINED CONCRETE AND SOIL DATA
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Concentrations in picograms per gram (pg/g)

PCB 105

General Statistics			
Number of Valid Observations	26	Number of Distinct Observations	26
Raw Statistics		Log-transformed Statistics	
Minimum	36.6	Minimum of Log Data	3.6
Maximum	10500000	Maximum of Log Data	16.17
Mean	474578	Mean of log Data	8.549
Median	3595	SD of log Data	3.336
SD	2050390		
Coefficient of Variation	4.32		
Skewness	5.055		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wi k Test Statistic	0.243	Shapiro Wilk Test Statistic	0.964
Shapiro Wi k Critical Value	0.92	Shapiro Wilk Critical Value	0.92
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distr bution		Assuming Lognormal Distr bution	
95% Student's-t UCL	1161446	95% H-UCL	89003719
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2390453
95% Adjusted-CLT UCL (Chen-1995)	1561942	97.5% Chebyshev (MVUE) UCL	3199645
95% Modified-t UCL (Johnson-1978)	1227884	99% Chebyshev (MVUE) UCL	4789144
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.174	Data appear Lognormal at 5% Significance Level	
Theta Star	2733529		
MLE of Mean	474578		
MLE of Standard Deviation	1138978		
nu star	9.028		
Approximate Chi Square Value (.05)	3.344	Nonparametric Statistics	
Adjusted Level of Significance	0.0398	95% CLT UCL	1135997
Adjusted Chi Square Value	3.118	95% Jackknife UCL	1161446
		95% Standard Bootstrap UCL	1113593
Anderson-Darling Test Statistic	2.356	95% Bootstrap-t UCL	8518002
Anderson-Darling 5% Critical Value	0.909	95% Hall's Bootstrap UCL	6241994
Kolmogorov-Smirnov Test Statistic	0.246	95% Percentile Bootstrap UCL	1271181
Kolmogorov-Smirnov 5% Critical Value	0.191	95% BCA Bootstrap UCL	1717179
Data not Gamma Distr buted at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	2227354
		97.5% Chebyshev(Mean, Sd) UCL	2985782
Assuming Gamma Distr bution		99% Chebyshev(Mean, Sd) UCL	4475566
95% Approximate Gamma UCL	1281303		
95% Adjusted Gamma UCL	1373928		
Potential UCL to Use		**Use 99% Chebyshev (Mean, Sd) UCL**	**4475566**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

SUPPLEMENT A

ProUCL OUTPUT, COMBINED CONCRETE AND SOIL DATA
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Concentrations in picograms per gram (pg/g)

PCB 114

General Statistics			
Number of Valid Data	26	Number of Detected Data	15
Number of Distinct Detected Data	15	Number of Non-Detect Data	11
		Percent Non-Detects	42.31%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	5.85	Minimum Detected	1.766
Maximum Detected	842000	Maximum Detected	13.64
Mean of Detected	63194	Mean of Detected	7.111
SD of Detected	215716	SD of Detected	3.334
Minimum Non-Detect	4.33	Minimum Non-Detect	1.466
Maximum Non-Detect	1834	Maximum Non-Detect	7.514
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	20
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	76.92%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.32	Shapiro Wilk Test Statistic	0.962
5% Shapiro Wilk Critical Value	0.881	5% Shapiro Wilk Critical Value	0.881
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	36564	Mean	5.752
SD	164513	SD	3.306
95% DL/2 (t) UCL	91675	95% H-Stat (DL/2) UCL	4560308
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	4.559
		SD in Log Scale	4.06
		Mean in Original Scale	36461
		SD in Original Scale	164536
		95% t UCL	91579
		95% Percentile Bootstrap UCL	101009
		95% BCA Bootstrap UCL	136276
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.195	Data appear Lognormal at 5% Significance Level	
Theta Star	323801		
nu star	5.855		
A-D Test Statistic	1.183	Nonparametric Statistics	
5% A-D Critical Value	0.881	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.881	Mean	36484
5% K-S Critical Value	0.246	SD	161336
Data not Gamma Distributed at 5% Significance Level		SE of Mean	32751
		95% KM (t) UCL	92427
Assuming Gamma Distribution		95% KM (z) UCL	90354
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	91600
Minimum	1.00E-12	95% KM (bootstrap t) UCL	879156
Maximum	842000	95% KM (BCA) UCL	101059
Mean	36458	95% KM (Percentile Bootstrap) UCL	100303
Median	45.49	95% KM (Chebyshev) UCL	179242
SD	164537	97.5% KM (Chebyshev) UCL	241014
k star	0.0685	99% KM (Chebyshev) UCL	362353
Theta star	531862		
Nu star	3.564	**Potential UCLs to Use**	
AppChi2	0.558	**99% KM (Chebyshev) UCL**	**362353**
95% Gamma Approximate UCL	233052.000		
95% Adjusted Gamma UCL	265800.000		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

SUPPLEMENT A

ProUCL OUTPUT, COMBINED CONCRETE AND SOIL DATA
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Concentrations in picograms per gram (pg/g)

PCB 118

General Statistics			
Number of Valid Observations	26	Number of Distinct Observations	26
Raw Statistics		Log-transformed Statistics	
Minimum	60.9	Minimum of Log Data	4.109
Maximum	18100000	Maximum of Log Data	16.71
Mean	806877	Mean of log Data	9.078
Median	6480	SD of log Data	3.239
SD	3535964		
Coefficient of Variation	4.382		
Skewness	5.059		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wi k Test Statistic	0.24	Shapiro Wilk Test Statistic	0.969
Shapiro Wi k Critical Value	0.92	Shapiro Wilk Critical Value	0.92
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distr bution		Assuming Lognormal Distr bution	
95% Student's-t UCL	1991403	95% H-UCL	86929610
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	3153769
95% Adjusted-CLT UCL (Chen-1995)	2682620	97.5% Chebyshev (MVUE) UCL	4216636
95% Modified-t UCL (Johnson-1978)	2106065	99% Chebyshev (MVUE) UCL	6304432
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.174	Data appear Lognormal at 5% Significance Level	
Theta Star	4648693		
MLE of Mean	806877		
MLE of Standard Deviation	1936730		
nu star	9.026		
Approximate Chi Square Value (.05)	3.342	Nonparametric Statistics	
Adjusted Level of Significance	0.0398	95% CLT UCL	1947516
Adjusted Chi Square Value	3.117	95% Jackknife UCL	1991403
		95% Standard Bootstrap UCL	1962157
Anderson-Darling Test Statistic	2.554	95% Bootstrap-t UCL	16828183
Anderson-Darling 5% Critical Value	0.909	95% Hall's Bootstrap UCL	13161327
Kolmogorov-Smirnov Test Statistic	0.266	95% Percentile Bootstrap UCL	2178341
Kolmogorov-Smirnov 5% Critical Value	0.191	95% BCA Bootstrap UCL	2934518
Data not Gamma Distr buted at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	3829597
		97.5% Chebyshev(Mean, Sd) UCL	5137531
Assuming Gamma Distr bution		99% Chebyshev(Mean, Sd) UCL	7706713
95% Approximate Gamma UCL	2178811		
95% Adjusted Gamma UCL	2336344		
Potential UCL to Use		**Use 99% Chebyshev (Mean, Sd) UCL**	**7706713**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

SUPPLEMENT A

ProUCL OUTPUT, COMBINED CONCRETE AND SOIL DATA
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Concentrations in picograms per gram (pg/g)

PCB 123

General Statistics			
Number of Valid Data	26	Number of Detected Data	16
Number of Distinct Detected Data	16	Number of Non-Detect Data	10
		Percent Non-Detects	38.46%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	4.03	Minimum Detected	1.394
Maximum Detected	560000	Maximum Detected	13.24
Mean of Detected	39337	Mean of Detected	6.793
SD of Detected	138995	SD of Detected	3.205
Minimum Non-Detect	3.59	Minimum Non-Detect	1.278
Maximum Non-Detect	1630	Maximum Non-Detect	7.396
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	19
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	7
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	73.08%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.307	Shapiro Wilk Test Statistic	0.966
5% Shapiro Wilk Critical Value	0.887	5% Shapiro Wilk Critical Value	0.887
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	24297	Mean	5.579
SD	109399	SD	3.266
95% DL/2 (t) UCL	60945	95% H-Stat (DL/2) UCL	3061277
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	4.666
		SD in Log Scale	3.821
		Mean in Original Scale	24210
		SD in Original Scale	109419
		95% t UCL	60865
		95% Percentile Bootstrap UCL	66693
		95% BCA Bootstrap UCL	89230
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.2	Data appear Lognormal at 5% Significance Level	
Theta Star	196503		
nu star	6.406		
A-D Test Statistic	1.276	Nonparametric Statistics	
5% A-D Critical Value	0.88	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.88	Mean	24226
5% K-S Critical Value	0.238	SD	107291
Data not Gamma Distributed at 5% Significance Level		SE of Mean	21731
		95% KM (t) UCL	61347
Assuming Gamma Distribution		95% KM (z) UCL	59972
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	60880
Minimum	1.00E-12	95% KM (bootstrap t) UCL	703664
Maximum	560000	95% KM (BCA) UCL	67649
Mean	24207	95% KM (Percentile Bootstrap) UCL	66614
Median	77.2	95% KM (Chebyshev) UCL	118952
SD	109420	97.5% KM (Chebyshev) UCL	159940
k star	0.0722	99% KM (Chebyshev) UCL	240452
Theta star	335183		
Nu star	3.755	**Potential UCLs to Use**	
AppChi2	0.628	**99% KM (Chebyshev) UCL**	**240452**
95% Gamma Approximate UCL	144867.000		
95% Adjusted Gamma UCL	164570.000		
Note: DL/2 is not a recommended method.			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

SUPPLEMENT A

ProUCL OUTPUT, COMBINED CONCRETE AND SOIL DATA
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Concentrations in picograms per gram (pg/g)

PCB 126

General Statistics			
Number of Valid Data	26	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	17
		Percent Non-Detects	65 38%
Raw Statistics		Log-transformed Statis ics	
Minimum Detected	17.1	Minimum Detected	2.839
Maximum Detected	124000	Maximum Detected	11.73
Mean of Detected	15320	Mean of Detected	6.601
SD of Detected	40807	SD of Detected	2.856
Minimum Non-Detect	2.16	Minimum Non-Detect	0.77
Maximum Non-Detect	8373	Maximum Non-Detect	9.033
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	25
For all methods (except KM, DL/2, and ROS Me hods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.15%

Warning: There are only 9 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.432	Shapiro Wilk Test Statistic	0.934
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Me hod	
Mean	5582	Mean	4.777
SD	24202	SD	2.922
95% DL/2 (t) UCL	13690	95% H-Stat (DL/2) UCL	218795
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE me hod failed to converge properly		Mean in Log Scale	2.457
		SD in Log Scale	3.562
		Mean in Original Scale	5304
		SD in Original Scale	24251
		95% t UCL	13428
		95% Percentile Bootstrap UCL	14724
		95% BCA Bootstrap UCL	19991
Gamma Distribution Test with Detected Values Only		Data Distribution Test wi h Detected Values Only	
k star (bias corrected)	0.231	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	66179		
nu star	4.167		
A-D Test Statis ic	0.8	Nonparametric Statistics	
5% A-D Cri ical Value	0.831	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.831	Mean	5345
5% K-S Critical Value	0.305	SD	23773
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	4945
		95% KM (t) UCL	13793
Assuming Gamma Distribution		95% KM (z) UCL	13480
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	13445
Minimum	17.1	95% KM (bootstrap t) UCL	144401
Maximum	124000.000	95% KM (BCA) UCL	14865.000
Mean	15185.000	95% KM (Percentile Bootstrap) UCL	14931.000
Median	14377.000	95% KM (Chebyshev) UCL	26902.000
SD	23115.000	97.5% KM (Chebyshev) UCL	36230.000
k star	0.546	99% KM (Chebyshev) UCL	54552.000
Theta star	27826.000		
Nu star	28.380	**Potential UCLs to Use**	
AppChi2	17.220	**95% KM (t) UCL**	**13793**
95% Gamma Approximate UCL	25021 000		
95% Adjusted Gamma UCL	25884.000		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommenda ions are based upon the results of he simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

SUPPLEMENT A

ProUCL OUTPUT, COMBINED CONCRETE AND SOIL DATA
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Concentrations in picograms per gram (pg/g)

PCB 156, 157

General Statistics			
Number of Valid Data	26	Number of Detected Data	24
Number of Distinct Detected Data	24	Number of Non-Detect Data	2
		Percent Non-Detects	7.69%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	5.27	Minimum Detected	1.662
Maximum Detected	1530000	Maximum Detected	14.24
Mean of Detected	75255	Mean of Detected	6.828
SD of Detected	311569	SD of Detected	3.305
Minimum Non-Detect	46.6	Minimum Non-Detect	3.842
Maximum Non-Detect	1470	Maximum Non-Detect	7.293
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	16
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	10
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	61.54%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.258	Shapiro Wilk Test Statistic	0.971
5% Shapiro Wilk Critical Value	0.916	5% Shapiro Wilk Critical Value	0.916
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	69495	Mean	6.677
SD	299538	SD	3.251
95% DL/2 (t) UCL	169838	95% H-Stat (DL/2) UCL	8458537
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	6.58
		SD in Log Scale	3.305
		Mean in Original Scale	69471
		SD in Original Scale	299544
		95% t UCL	169816
		95% Percentile Bootstrap UCL	185588
		95% BCA Bootstrap UCL	256876
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.178	Data appear Lognormal at 5% Significance Level	
Theta Star	423697		
nu star	8.525		
A-D Test Statistic	2.157	Nonparametric Statistics	
5% A-D Critical Value	0.906	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.906	Mean	69478
5% K-S Critical Value	0.198	SD	293725
Data not Gamma Distributed at 5% Significance Level		SE of Mean	58843
		95% KM (t) UCL	169991
Assuming Gamma Distribution		95% KM (z) UCL	166267
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	169823
Minimum	1.00E-12	95% KM (bootstrap t) UCL	2211825
Maximum	1530000	95% KM (BCA) UCL	186483
Mean	69466	95% KM (Percentile Bootstrap) UCL	184427
Median	620.5	95% KM (Chebyshev) UCL	325970
SD	299545	97.5% KM (Chebyshev) UCL	436954
k star	0.127	99% KM (Chebyshev) UCL	654961
Theta star	547397		
Nu star	6.599	**Potential UCLs to Use**	
AppChi2	1.953	**99% KM (Chebyshev) UCL**	**654961**
95% Gamma Approximate UCL	234691.000		
95% Adjusted Gamma UCL	255934.000		
Note: DL/2 is not a recommended method.			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

SUPPLEMENT A

ProUCL OUTPUT, COMBINED CONCRETE AND SOIL DATA
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Concentrations in picograms per gram (pg/g)

PCB 167

General Statistics			
Number of Valid Data	26	Number of Detected Data	22
Number of Distinct Detected Data	22	Number of Non-Detect Data	4
		Percent Non-Detects	15.38%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.97	Minimum Detected	0.678
Maximum Detected	509000	Maximum Detected	13.14
Mean of Detected	27339	Mean of Detected	6.093
SD of Detected	108249	SD of Detected	3.101
Minimum Non-Detect	2.77	Minimum Non-Detect	1.019
Maximum Non-Detect	1316	Maximum Non-Detect	7.182
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	17
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	9
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	65.38%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.271	Shapiro Wilk Test Statistic	0.975
5% Shapiro Wilk Critical Value	0.911	5% Shapiro Wilk Critical Value	0.911
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	23177	Mean	5.677
SD	99710	SD	3.235
95% DL/2 (t) UCL	56580	95% H-Stat (DL/2) UCL	2846963
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	5.5
		SD in Log Scale	3.236
		Mean in Original Scale	23136
		SD in Original Scale	99720
		95% t UCL	56542
		95% Percentile Bootstrap UCL	62018
		95% BCA Bootstrap UCL	98833
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.187	Data appear Lognormal at 5% Significance Level	
Theta Star	146345		
nu star	8.22		
A-D Test Statistic	2.161	Nonparametric Statistics	
5% A-D Critical Value	0.9	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.9	Mean	23141
5% K-S Critical Value	0.206	SD	97782
Data not Gamma Distributed at 5% Significance Level		SE of Mean	19628
		95% KM (t) UCL	56668
Assuming Gamma Distribution		95% KM (z) UCL	55426
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	56546
Minimum	1.00E-12	95% KM (bootstrap t) UCL	802484
Maximum	509000	95% KM (BCA) UCL	62515
Mean	23133	95% KM (Percentile Bootstrap) UCL	61736
Median	149.5	95% KM (Chebyshev) UCL	108697
SD	99720	97.5% KM (Chebyshev) UCL	145717
k star	0.105	99% KM (Chebyshev) UCL	218436
Theta star	219826		
Nu star	5.472	**Potential UCLs to Use**	
AppChi2	1.376	**99% KM (Chebyshev) UCL**	**218436**
95% Gamma Approximate UCL	91974.000		
95% Adjusted Gamma UCL	101533.000		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

SUPPLEMENT A

ProUCL OUTPUT, COMBINED CONCRETE AND SOIL DATA
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Concentrations in picograms per gram (pg/g)

PCB 169

General Statistics			
Number of Valid Data	26	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	21
		Percent Non-Detects	80.77%
Raw Statistics		Log-transformed Statis ics	
Minimum Detected	9.68	Minimum Detected	2.27
Maximum Detected	252	Maximum Detected	5.529
Mean of Detected	130.4	Mean of Detected	4.36
SD of Detected	109.9	SD of Detected	1.348
Minimum Non-Detect	1.09	Minimum Non-Detect	0.0862
Maximum Non-Detect	37214	Maximum Non-Detect	10.52
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Me hods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 5 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.884	Shapiro Wilk Test Statistic	0.893
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Me hod	
Mean	916.1	Mean	3.406
SD	3648	SD	2.687
95% DL/2 (t) UCL	2138	95% H-Stat (DL/2) UCL	17836
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE me hod failed to converge properly		Mean in Log Scale	1.409
		SD in Log Scale	1.613
		Mean in Original Scale	26.87
		SD in Original Scale	67.71
		95% t UCL	49.55
		95% Percentile Bootstrap UCL	49.97
		95% BCA Bootstrap UCL	58.59
Gamma Distribution Test with Detected Values Only		Data Distribution Test wi h Detected Values Only	
k star (bias corrected)	0.58	Data appear Normal at 5% Significance Level	
Theta Star	224.6		
nu star	5.804		
A-D Test Sta is ic	0.309	Nonparametric Statistics	
5% A-D Cri ical Value	0.69	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.69	Mean	41.03
5% K-S Critical Value	0.364	SD	71.77
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	18.08
		95% KM (t) UCL	71.92
Assuming Gamma Distribution		95% KM (z) UCL	70.77
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	71.77
Minimum	1.00E-12	95% KM (bootstrap t) UCL	71.59
Maximum	252.000	95% KM (BCA) UCL	239
Mean	25.070	95% KM (Percen ile Bootstrap) UCL	130
Median	0.000	95% KM (Chebyshev) UCL	119.9
SD	68.390	97.5% KM (Chebyshev) UCL	154
k star	0.058	99% KM (Chebyshev) UCL	221
Theta star	433.700		
Nu star	3.006	**Potential UCLs to Use**	
AppChi2	0.374	95% KM (t) UCL	71.92
95% Gamma Approximate UCL	201.400	**95% KM (Percentile Bootstrap) UCL**	**130**
95% Adjusted Gamma UCL	232.100		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommenda ions are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, he user may want to consult a statistician.

SUPPLEMENT A

ProUCL OUTPUT, COMBINED CONCRETE AND SOIL DATA
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Concentrations in picograms per gram (pg/g)

PCB 189

General Statistics			
Number of Valid Data	26	Number of Detected Data	21
Number of Distinct Detected Data	21	Number of Non-Detect Data	5
		Percent Non-Detects	19.23%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.25	Minimum Detected	0.223
Maximum Detected	302000	Maximum Detected	12.62
Mean of Detected	15852	Mean of Detected	4.992
SD of Detected	65754	SD of Detected	3.026
Minimum Non-Detect	1.12	Minimum Non-Detect	0.113
Maximum Non-Detect	967	Maximum Non-Detect	6.874
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	21
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	80.77%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.257	Shapiro Wilk Test Statistic	0.956
5% Shapiro Wilk Critical Value	0.908	5% Shapiro Wilk Critical Value	0.908
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	12833	Mean	4.445
SD	59150	SD	3.248
95% DL/2 (t) UCL	32648	95% H-Stat (DL/2) UCL	892290
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	4.088
		SD in Log Scale	3.454
		Mean in Original Scale	12805
		SD in Original Scale	59156
		95% t UCL	32622
		95% Percentile Bootstrap UCL	35279
		95% BCA Bootstrap UCL	48458
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.171	Data appear Lognormal at 5% Significance Level	
Theta Star	92757		
nu star	7.178		
A-D Test Statistic	2.829	Nonparametric Statistics	
5% A-D Critical Value	0.905	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.905	Mean	12814
5% K-S Critical Value	0.211	SD	58005
Data not Gamma Distributed at 5% Significance Level		SE of Mean	11657
		95% KM (t) UCL	32725
Assuming Gamma Distribution		95% KM (z) UCL	31987
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	32630
Minimum	1.25	95% KM (bootstrap t) UCL	1302238
Maximum	302000	95% KM (BCA) UCL	36079
Mean	16192	95% KM (Percentile Bootstrap) UCL	35874
Median	501.5	95% KM (Chebyshev) UCL	63624
SD	58816	97.5% KM (Chebyshev) UCL	85610
k star	0.198	99% KM (Chebyshev) UCL	128797
Theta star	81586		
Nu star	10.32	**Potential UCLs to Use**	
AppChi2	4.143	**99% KM (Chebyshev) UCL**	**128797**
95% Gamma Approximate UCL	40336.000		
95% Adjusted Gamma UCL	42993.000		
Note: DL/2 is not a recommended method.			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

SUPPLEMENT A

ProUCL OUTPUT, COMBINED CONCRETE AND SOIL DATA
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Concentrations in picograms per gram (pg/g)

Aroclor 1232

General Statistics			
Number of Valid Data	26	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	24
		Percent Non-Detects	92 31%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	610	Minimum Detected	6.413
Maximum Detected	1400	Maximum Detected	7.244
Mean of Detected	1005	Mean of Detected	6.829
SD of Detected	558 6	SD of Detected	0.587
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	20000	Maximum Non-Detect	9.903
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

t is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
t is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	511 5	Mean	3.341
SD	1960	SD	1.968
95% DL/2 (t) UCL	1168	95% H-Stat (DL/2) UCL	927.8
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% t UCL	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	641.6
5% K-S Critical Value	N/A	SD	154.8
Data not Gamma Distributed at 5% Significance Level		SE of Mean	43.79
		95% KM (t) UCL	716.4
Assuming Gamma Distribution		95% KM (z) UCL	713.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1161
Minimum	N/A	95% KM (bootstrap t) UCL	N/A
Maximum	N/A	95% KM (BCA) UCL	1400
Mean	N/A	95% KM (Percentile Bootstrap) UCL	N/A
Median	N/A	95% KM (Chebyshev) UCL	832.5
SD	N/A	97.5% KM (Chebyshev) UCL	915
k star	N/A	99% KM (Chebyshev) UCL	1077
Theta star	N/A		
Nu star	N/A	**Potential UCLs to Use**	
AppChi2	N/A	**95% KM (t) UCL**	**716.4**
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	N/A
95% Adjusted Gamma UCL	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

SUPPLEMENT A

ProUCL OUTPUT, COMBINED CONCRETE AND SOIL DATA
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Concentrations in picograms per gram (pg/g)

Aroclor 1248

General Statistics			
Number of Valid Data	26	Number of Detected Data	20
Number of Distinct Detected Data	19	Number of Non-Detect Data	6
		Percent Non-Detects	23.08%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	38	Minimum Detected	3.638
Maximum Detected	390000	Maximum Detected	12.87
Mean of Detected	22102	Mean of Detected	6.072
SD of Detected	86779	SD of Detected	2.57
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	100	Maximum Non-Detect	4.605
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	12
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	14
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	46.15%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.273	Shapiro Wilk Test Statistic	0.839
5% Shapiro Wilk Critical Value	0.905	5% Shapiro Wilk Critical Value	0.905
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	17006	Mean	5.264
SD	76245	SD	2.714
95% DL/2 (t) UCL	42547	95% H-Stat (DL/2) UCL	129784
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	4.808
		SD in Log Scale	3.304
		Mean in Original Scale	17002
		SD in Original Scale	76246
		95% t UCL	42544
		95% Percentile Bootstrap UCL	46737
		95% BCA Bootstrap UCL	62122
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.194	Data do not follow a Discernable Distribution (0.05)	
Theta Star	114012		
nu star	7.754		
A-D Test Statistic	3.147	Nonparametric Statistics	
5% A-D Critical Value	0.893	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.893	Mean	17011
5% K-S Critical Value	0.215	SD	74763
Data not Gamma Distributed at 5% Significance Level		SE of Mean	15043
		95% KM (t) UCL	42707
Assuming Gamma Distribution		95% KM (z) UCL	41755
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	42552
Minimum	1.00E-12	95% KM (bootstrap t) UCL	387404
Maximum	390000	95% KM (BCA) UCL	47403
Mean	17002	95% KM (Percentile Bootstrap) UCL	46383
Median	120	95% KM (Chebyshev) UCL	82583
SD	76246	97.5% KM (Chebyshev) UCL	110956
k star	0.0907	99% KM (Chebyshev) UCL	166689
Theta star	187420		
Nu star	4.717	**Potential UCLs to Use**	
AppChi2	1.024	**99% KM (Chebyshev) UCL**	**166689**
95% Gamma Approximate UCL	78334		
95% Adjusted Gamma UCL	87418		
Note: DL/2 is not a recommended method.			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

SUPPLEMENT A

ProUCL OUTPUT, COMBINED CONCRETE AND SOIL DATA
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Concentrations in picograms per gram (pg/g)

Aroclor 1254

General Statistics			
Number of Valid Data	26	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	23
		Percent Non-Detects	88.46%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	56	Minimum Detected	4.025
Maximum Detected	19000	Maximum Detected	9.852
Mean of Detected	7119	Mean of Detected	7.206
SD of Detected	10351	SD of Detected	2.95
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	20000	Maximum Non-Detect	9.903
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 3 Distinct Detected Values in this data set
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Sta istics			
Normal Distribution Test with Detected Values Only		Lognormal Distribu ion Test wi h Detected Values Only	
Shapiro Wilk Test Statistic	0.837	Shapiro Wilk Test Statistic	0.975
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Subs itution Me hod		DL/2 Substitution Method	
Mean	1238	Mean	3.47
SD	4131	SD	2.235
95% DL/2 (t) UCL	2622	95% H-Stat (DL/2) UCL	2786
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Me hod	
MLE method failed to conver_e . ro. erl.		Mean in Log Scale	-6.534
		SD in Log Scale	7.554
		Mean in Original Scale	821.6
		SD in Original Scale	3735
		95% t UCL	2073
		95% Percentile Bootstrap UCL	2197
		95% BCA Bootstrap UCL	3105
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Sta istics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	903.5
5% K-S Critical Value	N/A	SD	3720
Data not Gamma Distributed at 5% Significance Level		SE of Mean	911.2
		95% KM (t) UCL	2460
Assuming Gamma Distribution		95% KM (z) UCL	2402
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2601
Minimum	N/A	95% KM (bootstrap t) UCL	5445
Maximum	N/A	95% KM (BCA) UCL	N/A
Mean	N/A	95% KM (Percentile Bootstrap) UCL	19000
Median	N/A	95% KM (Chebyshev) UCL	4875
SD	N/A	97.5% KM (Chebyshev) UCL	6594
k star	N/A	99% KM (Chebyshev) UCL	9970
Theta star	N/A		
Nu star	N/A	**Potential UCLs to Use**	
AppChi2	N/A	**95% KM (t) UCL**	**2460**
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	19000
95% Adjusted Gamma UCL	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help he user to select the most appropriate 95% UCL.
These recommendations are based upon he results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For addi ional insight, he user may want to consult a statis ician.

SUPPLEMENT A
ProUCL OUTPUT, COMBINED CONCRETE AND SOIL DATA
Former Pechiney Cast Plate, Inc., Facility
Vernon, California

Concentrations in picograms per gram (pg/g)

Aroclor 1260

General Statistics			
Number of Valid Data	26	Number of Detected Data	17
Number of Distinct Detected Data	17	Number of Non-Detect Data	9
		Percent Non-Detects	34.62%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	26	Minimum Detected	3.258
Maximum Detected	200000	Maximum Detected	12.21
Mean of Detected	13594	Mean of Detected	5.788
SD of Detected	48437	SD of Detected	2.433
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	100	Maximum Non-Detect	4.605
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	15
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	11
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	57.69%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.314	Shapiro Wilk Test Statistic	0.862
5% Shapiro Wilk Critical Value	0.892	5% Shapiro Wilk Critical Value	0.892
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distr bution		Assuming Lognormal Distr bution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	8893	Mean	4.643
SD	39306	SD	2.54
95% DL/2 (t) UCL	22060	95% H-Stat (DL/2) UCL	31690
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	3.835
		SD in Log Scale	3.476
		Mean in Original Scale	8889
		SD in Original Scale	39307
		95% t UCL	22057
		95% Percentile Bootstrap UCL	24160
		95% BCA Bootstrap UCL	32996
Gamma Distr bution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.202	Data do not follow a Discernable Distribution (0.05)	
Theta Star	67293		
nu star	6.868		
A-D Test Statistic	2.825	Nonparametric Statistics	
5% A-D Critical Value	0.884	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.884	Mean	8897
5% K-S Critical Value	0.232	SD	38542
Data not Gamma Distr buted at 5% Significance Level		SE of Mean	7791
		95% KM (t) UCL	22206
Assuming Gamma Distribution		95% KM (z) UCL	21713
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	22064
Minimum	1.00E-12	95% KM (bootstrap t) UCL	1102522
Maximum	200000	95% KM (BCA) UCL	23254
Mean	8888	95% KM (Percentile Bootstrap) UCL	24217
Median	42	95% KM (Chebyshev) UCL	42859
SD	39307	97.5% KM (Chebyshev) UCL	57554
k star	0.077	99% KM (Chebyshev) UCL	86419
Theta star	115475		
Nu star	4.002	**Potential UCLs to Use**	
AppChi2	0.723	**99% KM (Chebyshev) UCL**	**86419**
95% Gamma Approximate UCL	49227		
95% Adjusted Gamma UCL	55644		
Note: DL/2 is not a recommended method.			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.